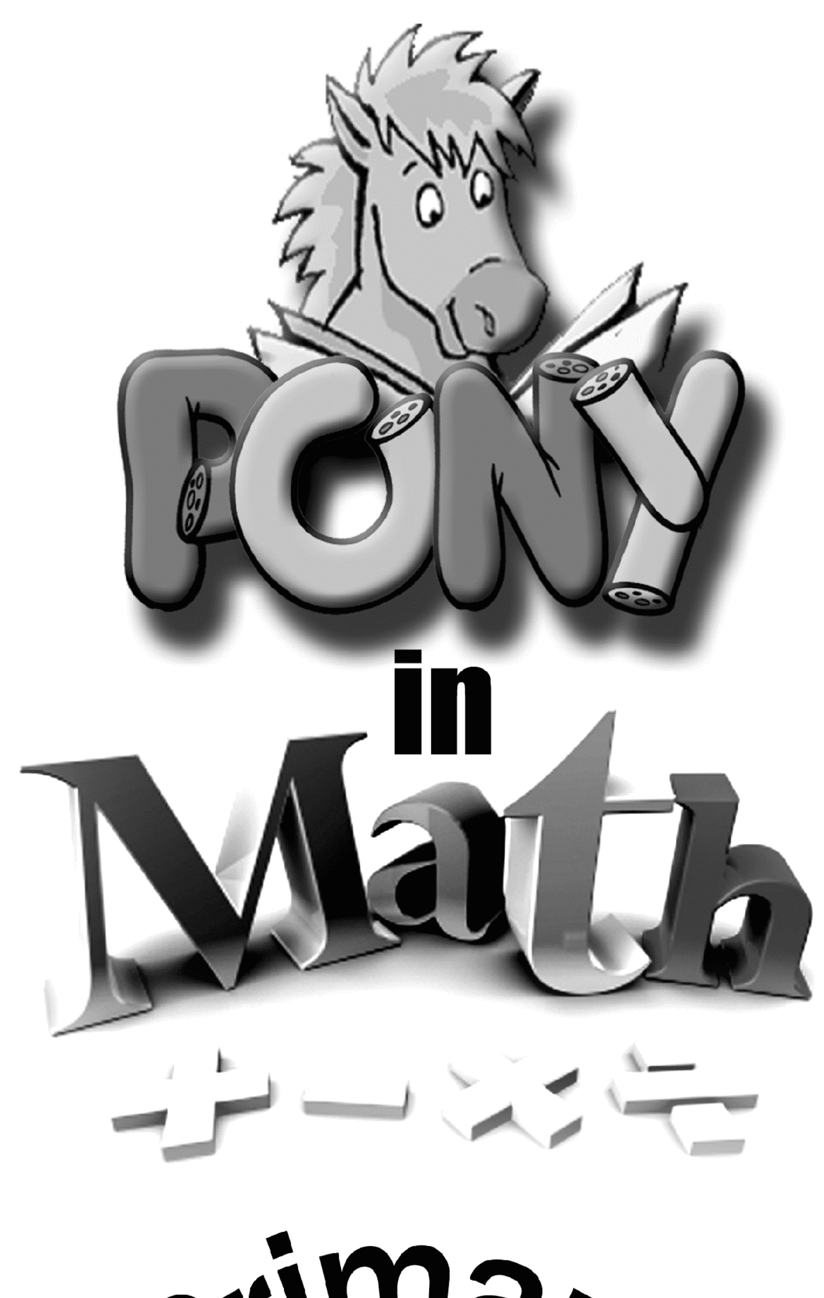




SECOND TERM

Unit 1

Natural Numbers



The set

is a well-defined collection of objects.
Each object of a set is called a member or an element of the set.

- A pair of braces { } is used to designate a set with the elements listed or written inside the braces
- Capital letters are used to designate sets.
- Small letters may name elements of sets.
- The elements are written without repeating and the order of elements not important.

The set of digits of the number 56647 is A = { 5 , 6 , 4 , 7 }

Types of sets

A null set or an empty set

A set containing no elements and is denoted by the symbol " ∅ " or { }.

{Cats that can fly} = { } = ∅

A Finite set

A set that contains a countable number of elements.

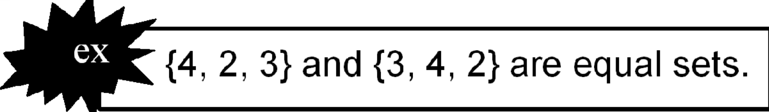
{Letters in the word "Good"} = {G, o, d}

An infinite set.

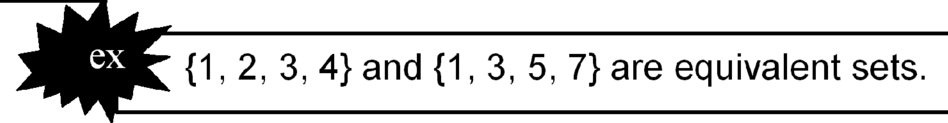
A set that contains an uncountable number of elements.

{ Whole numbers } = {1, 2, 3, ... }

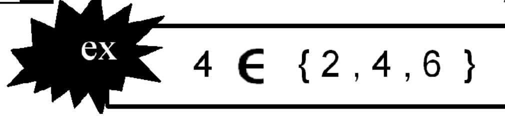
Equal sets are sets which contain exactly the same elements.



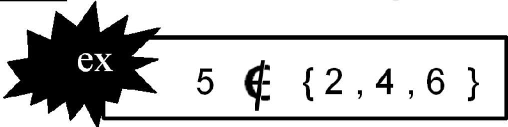
Equivalent sets are sets which contain the same number of elements.



The symbol " $\in$ " is used to denote that an object is an element of the set.

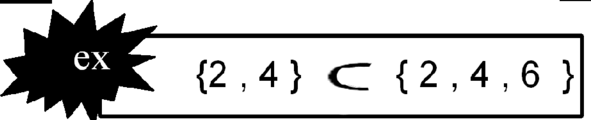


The symbol " $\notin$ " indicates that an object is not an element of the set.

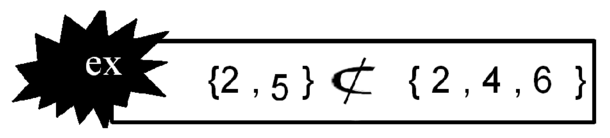


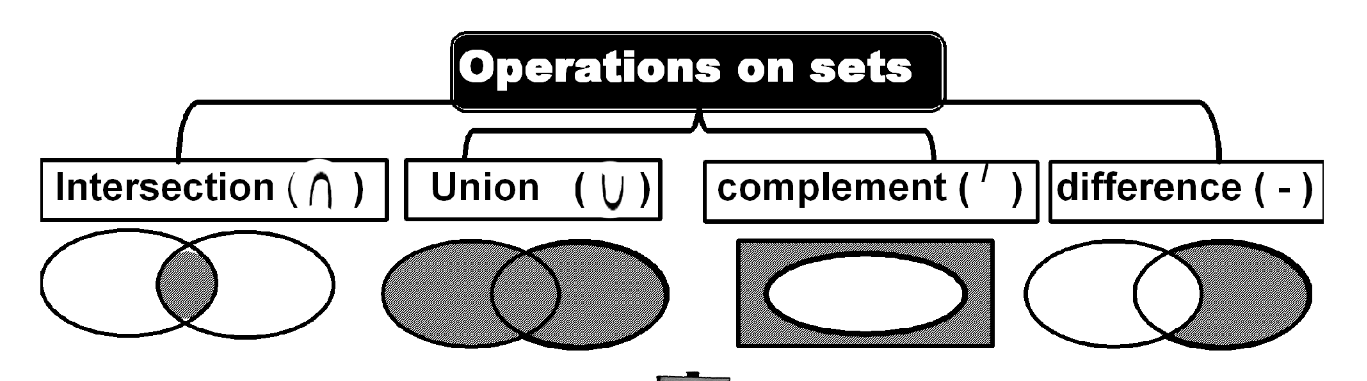
The universal set containing all the elements that can be used in a question is called the universal set. It is written as **U**.

The symbol " $\subset$ " is used to denote that a set is a subset of another set.



The symbol " $\not\subset$ " is used to denote that a set is not a subset of another set







In the Venn diagram, u is the universal set.

U = ……………………………………………………

M = ……………………………………………………

N = ……………………………………………………

u

M, N, 2, 3, 4, 7, 9, 6, 5, 8

M \ = ……………………………………………

N \ = ……………………………………………

M U N = ………………………………   M ? N = ………………………………

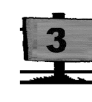
M – N = ………………………………   N – M = ………………………………

Complete using (∈ , ∉ , ⊂ , ⊄)

5	……	M	3	……	M	7	……	M
8	……	N	6	……	N	7	……	N
{ 2 , 5 }	……	M	{ 3 , 4 }	……	M	{ 2 , 3 }	……	M
{ 3 , 5 }	……	N	{ 4 , 7 }	……	N	{ 6 , 8 }	……	N
N	……	N	M	……	N	U	……	N
M	……	M	N	……	M	U	……	M
U	……	U	N	……	U	M	……	U

Complete using (∈ , ∉ , ⊂ , ⊄)

5	….	{ 5 , 4 }	{ 5 , 4 }	……	{ 5 , 4 }	{ 1 , 2 }	……	{ 1 , 2 }
4	….	{ 54 }	{ 3 , 7 }	……	{ 6 ,4 }	{ 2 , 3 }	……	{ 1,2,3 }
9	….	{ 4 , 5 , 9 }	{ }	……	{ 65,45 }	{ 2 }	……	{ 2 , 3 , 4 }
7	….	{ 37 , 73 }	Ø	……	{ 6 , 2 }	2	……	{ 2 , 3 , 4 }
2	….	{ 22 , 32 }	{ 1 , 2 }	……	{ 12 , 21 }	12	……	{ 1 , 2 }
0	….	{ 10,50,20 }	{ 2 , 4 }	……	{ 2 , 3 , 4 }	12	……	{ 12 , 21 }
1	….	{ 1 , 2 , 3 }	{ 2 , 3 , 4 }	……	{ 2 , 4 }	0	……	{ }



Lesson 2 The set of natural numbers

Representing natural numbers on the number line

The set of counting numbers = { 1 , 2 , 3 , 4 , 5 , ... }

The set of Natural numbers N = { 0 , 1 , 2 , 3 , 4 , 5 ,... }

(1) Mark ☑ for the correct statements and ☒ for the incorrect ones.

(a) $0 \in N$ ☐

(b) $\frac{2}{3} \in N$ ☐

(c) $1.5 \notin N$ ☐

(d) $475612 \in N$ ☐

(e) $\{0\} \subset N$ ☐

(f) $\varnothing \not\subset N$ ☐

(g) $\{1 , 4 , 5\} \subset N$ ☐

(h) $\{0 , 1 , 2 , 3 , ... , 100\} \subset N$ ☐

(2) Tell whether each statement is true T or false F.

(a) The natural number between 37 and 39 is 38 ☐

(b) There is only one natural number between 99 and 101 ☐

(c) There is no natural number between 999 and 1001 ☐

(d) There are exactly two natural numbers between 3 and 5 ☐

(e) The least natural number that is greater than 7 but less than 24 is 23 ☐

(3) Which of the following questions has answers of natural numbers.

(a) How many oranges are there in this basket?

(b) What is your weight in kilograms?

(c) How many cities are there in Egypt?

(4) Underline the natural numbers from the following numbers:

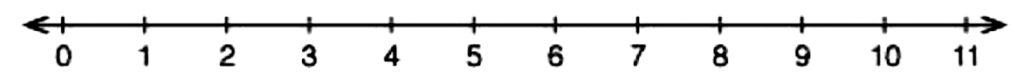
15 6.2 0 417 $\frac{4}{5}$ 0.7 91 328



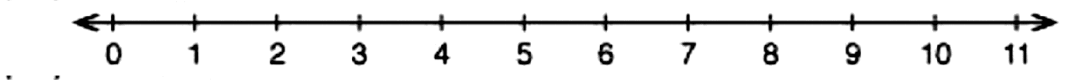


(5) Make graphs for each of the following.

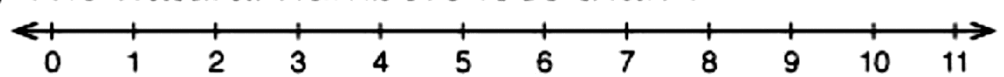
(a) The natural numbers between 4 and 8



(b) The even numbers between 2 and 6



(c) The natural numbers less than 7

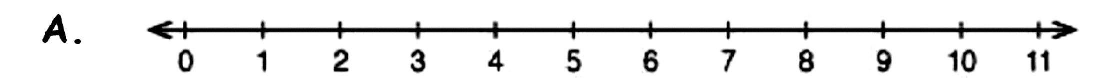


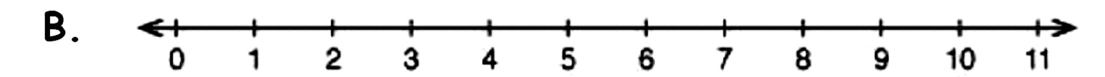
(6) Make a number - line graph for each set of natural

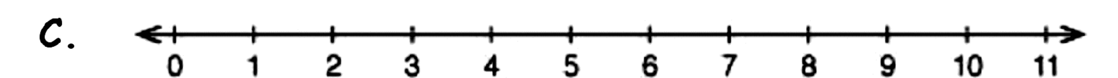
(a) {2 , 3}

(b) {2 , 3 , 4 , 5 , 6, 7}

(c) {0 , 1 , 2 , 3}

A. 

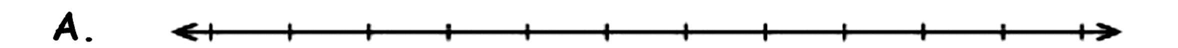
B. 

C. 

(a) {3 , 4 , 5 , 6 , ...}

(b) {3 , 6 , 9 , 12 , ...}

(c) {4 , 5 , 6 , 7 , ...}

A. 

B.

C.







3 Addition of natural numbers

For Example

3 + 2 = 5 will be shown as:

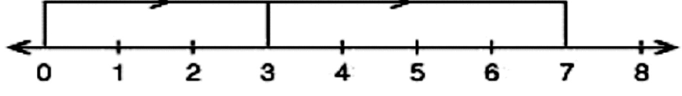
Start at 0 and move 3 units to the right. From 3 move 2 more units to the right.

This gives the answer 5

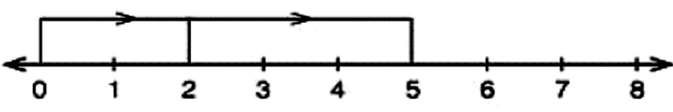
0 1 2 3 4 5 6 7 8

Complete:

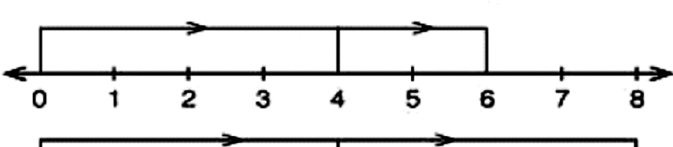
(a) 3 + ... = 7



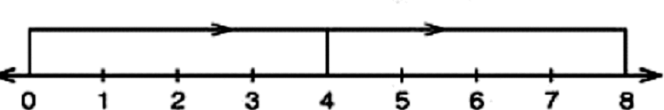
(b) 2 + ... = 5



(c) .... + ... = ...

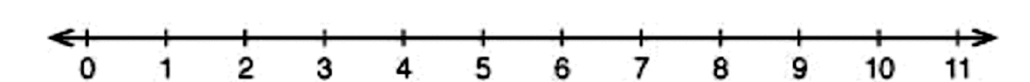


(d) .... + ... = ...

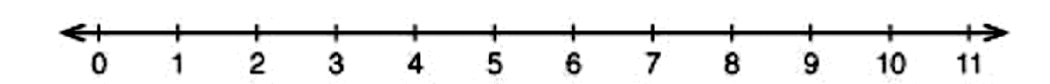


Use the number line to add the following natural numbers.

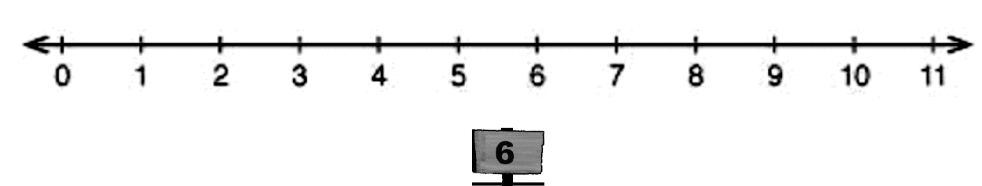
(a) 5 + 3



(b) 1 + 6



(c) 5 + 1



Properties of addition of natural numbers

1. Closure property :

The sum of any two natural numbers is a natural number.

i.e. the addition operation is always possible in $\mathbb{N}$ or $\mathbb{N}$ is closed under addition.

For example :

- $2 + 3 = 5 \in \mathbb{N}$
- $6 + 4 = 10 \in \mathbb{N}$

2. Commutative property :

For any two natural numbers a and b , we have : $a + b = b + a$

For example :

- $3 + 4 = 4 + 3 = 7$
- $6 + 8 = 8 + 6 = 14$

3. Associative property :

For any three natural numbers a , b and c , we have : $(a + b) + c = a + (b + c)$

For example :

$7 + 3 + 5 = (7 + 3) + 5 = 10 + 5 = 15$

also : $7 + 3 + 5 = 7 + (3 + 5) = 7 + 8 = 15$

i.e. $7 + 3 + 5 = (7 + 3) + 5 = 7 + (3 + 5)$

4. The existence of the additive neutral (identity) element in $\mathbb{N}$:

For any natural number a , we have : $a + 0 = 0 + a = a$

i.e. zero is the additive neutral element in $\mathbb{N}$

For example :

- $0 + 6 = 6$
- $3 + 0 = 3$

Find the numbers that will make the following statements true.

(a) 17 + ... = ... + 17 = 17

(b) 901 + ... = 91 + ...

(c) (6 + 8) + 9 = 6 + (....... + 9)

(d) (22 + ...) + 16 = 22 + (8 + 16)





Use the properties of addition to find the result.

Example: 53 + 28 + 47 = (28 + 53) + 47 commutation
= 28 + (53 + 47) association
= 28 + 100 = 128 addition

(a) 34 + 48 + 66 = ...
= ....
= ....

(b) 576 + 637 + 424 + 863
= ....
= ....
= ....

(c) 218 + 125 + 782 + 375
= ....
= ....
= ....

Complete :

213 + 57 = 57 + ... (................................ property)

149 + 673 = 673 + ... (................................ property)

17 + ... = ... + 17 = 17 (................................ property)

(6 + 8) + 9 = 6 + (.......... + 9) (................................ property)

(61 + 715) + 3 547 = ... + (715 + 3 547) (................................ property)



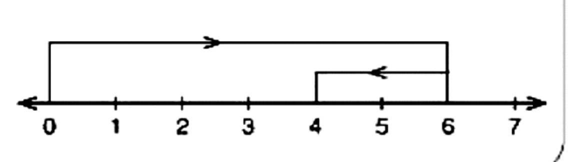


Lesson 4 Subtraction of natural numbers

Example (1)

6 – 2 = 4 will be shown as:

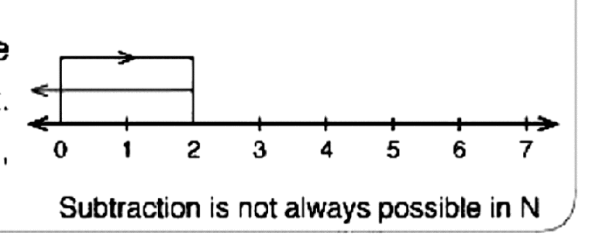
Start at 0 and move 6 units to the right. From 6 move 2 units to the left. This gives the answer 4



Example (2)

2 – 6 =

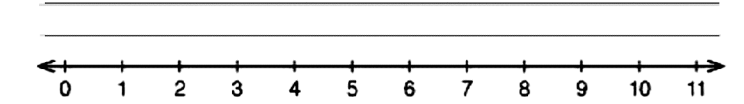
Start at 0 and move 2 units to the right. From 2 move 6 units to the left. This does not give an answer in N, Therefore 2 – 6 is impossible in N.



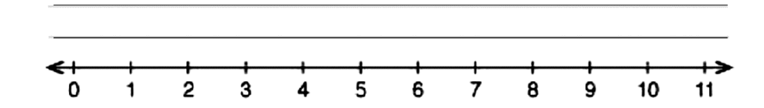
Subtraction is not always possible in N

Mention, stating reasons, which of the following subtractions are possible in N.

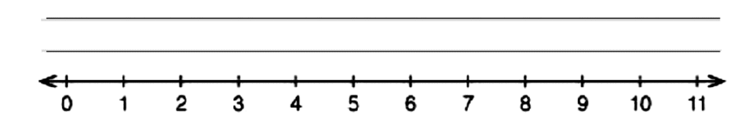
(a) 7 – 1



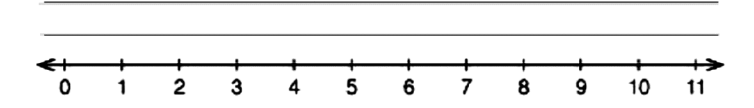
(b) 1 – 11



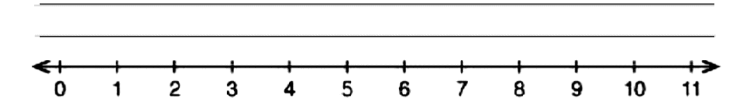
(c) 5 – 9



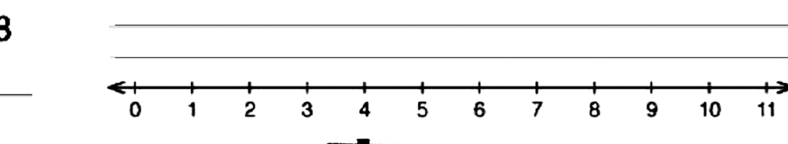
(d) 4 – 4



(e) 0 – 0



(f) 3 – 8





Lesson 5 Multiplication of natural numbers

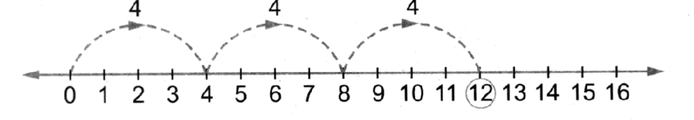
the multiplication operation is a repeated addition operation.

For example : $4 \times 3 = 4 + 4 + 4 = 12$

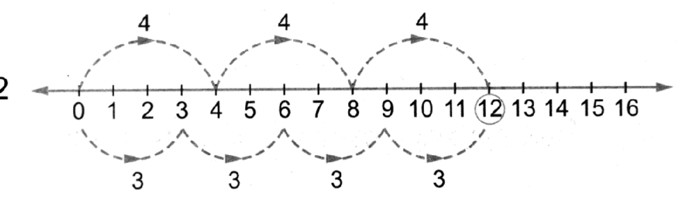
We can represent the product of two natural numbers on the number line.

For example : to multiply 4×3

Then, $4 \times 3 = 12$



* We can use the number line to show that $4 \times 3 = 3 \times 4 = 12$



Properties of multiplication of natural numbers

1. The closure property :

As addition is always possible in $\mathbb{N}$, therefore multiplication is also always possible in $\mathbb{N}$

i.e. multiplication operation is always possible in $\mathbb{N}$ or $\mathbb{N}$ is closed under multiplication.

For example : • $2 \times 5 = 10 \in \mathbb{N}$ • $4 \times 6 = 24 \in \mathbb{N}$

2. Commutative property :

For any two natural numbers a and b , we have : $a \times b = b \times a$

For example : • $5 \times 8 = 8 \times 5 = 40$ • $4 \times 7 = 7 \times 4 = 28$

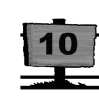
3. Associative property :

For any three natural numbers a , b and c , we have :
$a \times b \times c = (a \times b) \times c = a \times (b \times c)$

For example : • $2 \times 5 \times 3 = (2 \times 5) \times 3 = 10 \times 3 = 30$

Also , $2 \times 5 \times 3 = 2 \times (5 \times 3) = 2 \times 15 = 30$

i.e. $2 \times 5 \times 3 = (2 \times 5) \times 3 = 2 \times (5 \times 3)$





4. The existence of the multiplicative neutral element in $\mathbb{N}$:

For any natural number a , we have : $1 \times a = a \times 1 = a$
i.e. the number "1" is the multiplicative identity element in $\mathbb{N}$

For example : • $1 \times 5 = 5 \times 1 = 5$ • $35 \times 1 = 1 \times 35 = 35$

5. Multiplication by zero :

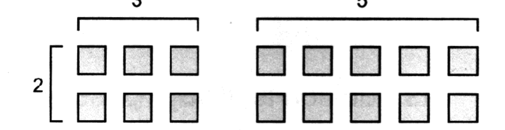
The product of any natural number by zero equals zero.

For example : • $5 \times 0 = 0$ • $0 \times 100 = 0$

6. Distribution of multiplication over addition property :

If a , b and c $\in \mathbb{N}$, then $a \times (b + c) = a \times b + a \times c$ and $(b + c) \times a = b \times a + c \times a$

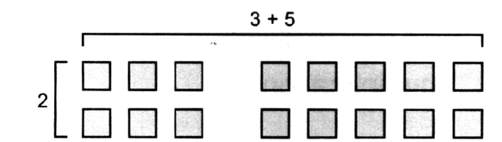
For example :



Since $2 \times 3 + 2 \times 5$

$= 6 + 10 = 16$

and



$2 \times (3 + 5)$

$= 2 \times 8 = 16$

• **Then,** $2 \times (3 + 5) = 2 \times 3 + 2 \times 5 = 16$

Find the numbers that will make the following statements true:

(a) $(12 \times 4) \times$ .... $= 12 \times (4 \times 7)$

(b) (........ $\times 10) \times 5 = 20 \times (10 \times 5)$

(c) $(20 \times 50) \times 30 =$ .... $\times (50 \times 30)$

(d) $7 \times (4 +$ .... $) = 7 \times 4 + 7 \times 5$

(e) $5 \times (1 + 4) = 5 \times$ .... $+ 5 \times$ ....

(f) $32 \times 9 + 32 \times 6 =$ .... $\times$ (........ + ...)

(g) $50 \times (11 + 17) =$ .... $\times$ .... + ... $\times$ ....

Show how the distributive property is used in computing 3×23





Use the associative and commutative properties to simplify each of the following :

(a) $5 \times 37 \times 2$ = ...
= ....
= ....

(b) $25 \times 7 \times 9 \times 4$ = ...
= ....
= ....

Use the distributive property to find :

[a] $34 \times 75 + 34 \times 25$ = ...
= ....
= ....

[b] $48 \times 17 - 28 \times 17$ = ...
= ....
= ....

Use the distributive property to find :

[a] 103×25 = ...
= ....
= ....
= ....

[b] 37×98 = ...
= ....
= ....
= ....

[c] 15×742 = ...
= ....
= ....
= ....





6 Division of natural numbers

- You know that $3 \times 8 = 24$

$24 \div 3 = 8 \in N$ — If 8 is multiplied by 3, it gives 24

$24 \div 8 = 3 \in N$ — If 3 is multiplied by 8, it gives 24

The division operation is possible in this case.

1 Since the division operation is not always possible in $\mathbb{N}$, then $\mathbb{N}$ is not closed under the division operation.

2 Since $12 \div 3 = 4$ while $3 \div 12$ is not possible in $\mathbb{N}$

i.e. $12 \div 3 \neq 3 \div 12$

Then division operation is not commutative in $\mathbb{N}$

3 Since $(24 \div 4) \div 2 = 6 \div 2 = 3$ while $24 \div (4 \div 2) = 24 \div 2 = 12$

i.e. $(24 \div 4) \div 2 \neq 24 \div (4 \div 2)$

Then the division operation is not associative in $\mathbb{N}$

4 The division operation in $\mathbb{N}$ has no identity element.

5 The division of any number ($\neq 0$) on zero has no meaning.

For example : $5 \div 0$ has no meaning, because there is no natural number, which when multiplied by zero gives 5

6 If we divide zero by any non-zero natural number , the result is zero.

For example : $\frac{0}{5} = 0$, $\frac{0}{3} = 0$, etc.

Divide:

(a) $12 \div 4$ (c) $36 \div 9$

(b) $4 \div 12$ (d) $9 \div 36$

(a) Does interchanging the dividend and divisor affect the quotient?

(b) Does the commutative property hold for division?





Which of the following statements are true?

(a) $49 \div 7 = 7 \div 49$

(b) $90 \div 15 = 15 \div 90$

(c) $(75 \div 15) \div 5 = 75 \div (15 \div 5)$

(d) $(28 \div 6) \in N$

Find the value of $(16 \div 8) \div 2$, $16 \div (8 \div 2)$.

Is the statement $(16 \div 8) \div 2 = 16 \div (8 \div 2)$ true?

Does the associative property hold for division?

....

....

....

Find the value of $24 \div (8 + 4)$, $(24 \div 8) + (24 \div 4)$.

Is the statement $24 \div (8 + 4) = (24 \div 8) + (24 \div 4)$ true?

Does the distributive property hold for division over addition?

....

....

....

....

....

....

Which of the following represents the number zero and which represents meaningless.

(a) $0 \div 10$ ....

(b) $90 \div 0$ ....

(c) $\frac{14 - 14}{21}$ ....

(d) $\frac{27 - 15}{5 - 5}$ ....





Unit test

1 **Name the property of addition and multiplication illustrated by each of the following statements**

(a) $2 + 3 = 3 + 2$ ....

(b) $3 + (2 + 5) = (3 + 2) + 5$ ....

(c) $(9 \times 4) \times 3 = 9 \times (4 \times 3)$ ....

(d) $7 \times 8 = 8 \times 7$ ....

(e) $25 \times 1 = 1 \times 25 = 25$ ....

(f) $11 + 0 = 0 + 11 = 11$ ....

2 **Express each of the following in the form of:**

(◯ × △) + (◯ × □) or (△ × ◯) + (□ × ◯).

(a) $3 \times (4 + 5)$ ....

(b) $3 \times (7 + 2)$ ....

(c) $3 \times (8 + 4)$ ....

(d) $(5 + 2) \times 4$ ....

(e) $(3 + 1) \times 7$ ....

(f) $(7 + 4) \times 11$ ....

3 (a) Find the value of $(18 - 5) - 2$, $18 - (5 - 2)$. Is the statement $(18 - 5) - 2 = 18 - (5 - 2)$ true? Does the associative property hold for subtraction?

....

....

....





(b) If N = {1, 4, 9, 16, 25, 36, 49, 64, 81}, which of the following statements is false?

① $25 \in N$

② $48 \in N$

③ $81 \notin N$

④ $35 \notin N$

⑤ $100 \in N$

⑥ $64 \notin N$

4 Complete each sentence using all the numbers 1, 3, 5, 7, and 9

(a) $\square \times \square \div \square + \square - \square = 1$

(b) $(\square \times \square + \square) \div \square + \square = 5$

(c) $\square \div \square \times \square + \square - \square = 5$

5 (a) Use the distributive property to calculate the value of:

① 43×1005

② 295×16

....

....

....

(b) Represent each of the following on the number line:

① Natural numbers that are less than or equal 3

② {3, 4, 5, ...}

0 1 2 3 4 5 6 7 8 9 10 11

0 1 2 3 4 5 6 7 8 9 10 11



6 (a) **Show the possible operations in N.**

① $30 \div 6$

② $8 - 80$

③ $5 \div$ zero, why?

④ zero $\div 100$, why?

⑤ $170 - 17$

⑥ 70×0

(b) **Find the result of each of the following**

① $(24 + 16) \div 4$, $(24 \div 4) + (16 \div 4)$

② $72 \div (6 + 3)$, $(72 \div 6) + (72 \div 3)$

Does division distribute over addition?

....

....

....

....

....

....





Lesson 4 Numerical patterns

is a sequence of numbers according to a particular rule.

N = {0, 1, 2, 3, 4, 5, ...}

Natural numbers (N) represents a sequence of numbers according to a particular rule which is :

((Each number is more than its predecessor by one))

The set of odd numbers = {1, 3, 5, 7, ...}
The set of even numbers = {0, 2, 4, 6, ...}

both are also a sequence of numbers according to the rule:

((Each number is more than its predecessor by 2))

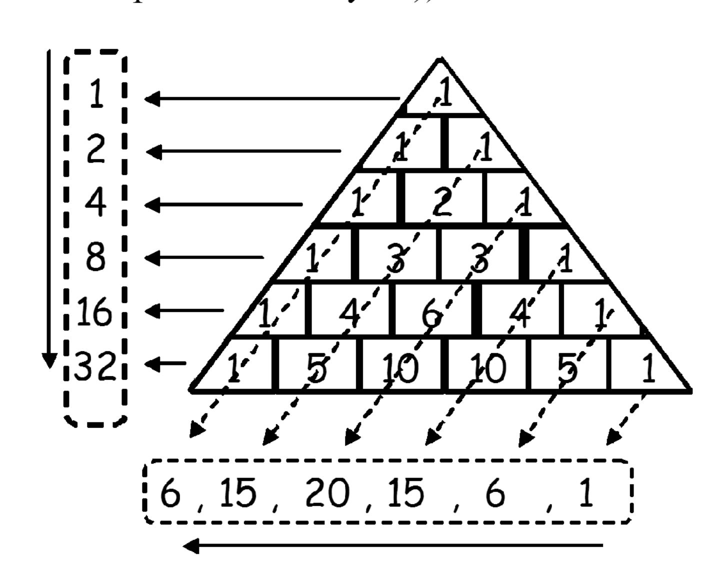
Pascal's triangle

In the Pascal's triangle figure, the pattern of each of :

(a) The sum of numbers of the rows
1 , 2 , 4 , 8 , 16 , 32 , ...

(b) the diagonals

1 , 6 , 15 , 20 , 15 , 6 , ...



Complete each of the following patterns :

[a] 90 , 85 , 80 , ... , ...
[b] 5 , 10 , 20 , 40 , ... , ...
[c] 1 , 2 , 4 , 7 , ... , ...
[d] 5 , 55 , 555 , 5555 , ... , ...
[e] 3 , 6 , 9 , 12 , ... , ...
[f] 3 , 6 , 12 , 24 , ... , ...
[g] 2 , 4 , 7 , 11 , ... , ...
[h] ● , ●● ●● , ●●● ●●● ●●● , ...

Hany has 3 test rabbits in his lab. If the number of rabbits is doubled each certain period. How many rabbits will be there in 5 periods ?

....

....

Unit 2

Equations

Lesson 1 Mathematical expressions

1 Numerical expressions

contains only numbers and operations.

$2 + 4$, $5 - 3$

2 Symbolic expressions

contains numbers , symbols and operations.

$x + 4$, $5 - y$

+	−	x	÷
Add , plus , sum , increased by	Subtract , minus , difference , less than	Mulitiply , times , product	Divided by , quotient

Write a symbolic expression for each of verbal expression :

a. Five more than the number x ....

b. Three less than the number y ....

c. Four times a number x ....

d. A number y divided by 6 ....

e. Twice of a number b ....

f. Six less than half a number x ....

g. Eight decreased by three times a number x ....

h. Twice the sum of a number m and seven ....

If Sally is x years old now ، use x to write an expression for each of the following numbers :

[a] The age of Sally after nine years. ....

[b] The age of Sally five years ago. ....

Complete using a suitable symbolic expressions :

[a] Add 5 to the number y, the symbolic expression is ....

[b] Add 3 to four times x, the symbolic expression is ....

[c] Subtract 4 from the half of the number x , the symbolic expression is ....

[d] The quotient of k by 2 , the symbolic expression is ....

Lesson 2 The constant and the variable

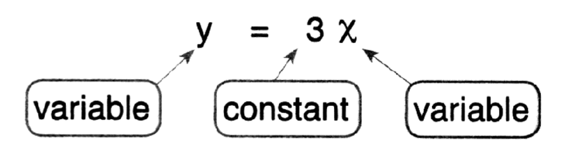
- **Constant and variable:**

If the price of one book is 3 pounds, complete:

- The price of two books = 2 × 3 = 6 pounds.
- The price of three books = 3 × 3 = 9 pounds.
- The price of four books = 4 × 3 = 12 pounds.
- The price of five books = 5 × 3 = 15 pounds.

variable constant variable

We can express that by



- The mathematical expression $y = 3\chi$ is called (equation)

such that χ, y are variables, 3 is constant.

A restaurant represents meal food of cost L.E. 25 with L.E. 7 for home service. Write the relation between the total cost.

Solution:

The price of one meal = ...

The price of two meals = ...

The price of three meals = ...

The price of χ meals = ...

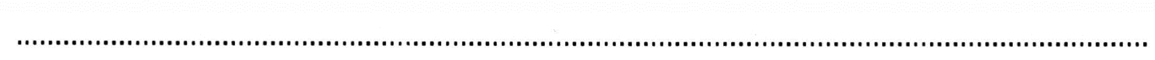
Then the relation is y = ...

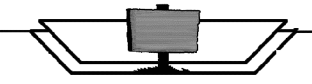
1) If the sallary of a worker is 30 pounds and 10 pounds for each hour for the extra time. Write the relation of the total daily sallary.

....

....

2) An isosceles triangle, its base length is 13 cm. Use the mathematical expressions to find the relation between the perimeter of the triangle and its sides.







Lesson 3 Equations

The relation $x + 2 = 5$ is called an equation. The symbol x is called the unknown or (the variable) in the equation.

Solving equation means finding the value of the unknown (symbol) included in the equation.

Solve each of the following equations :

$x - 3 = 5$ ....

....

....

....

....

$x + 2 = 4$ ....

....

....

....

....

$2x = 8$ ....

....

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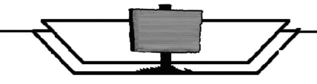
$\frac{1}{3}x = 6$ ....

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....

....

....





$2x + 8 = 14$ ....

$\frac{x}{7} - 3 = 2$ ....

$10 - x = 7$ ....

The product of a number x and 5 is 35 , find the number x

Unit 3

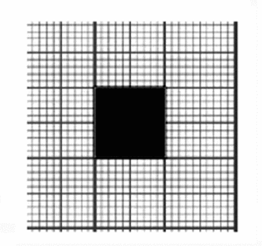
Measurement

Lesson 1 The area and its units

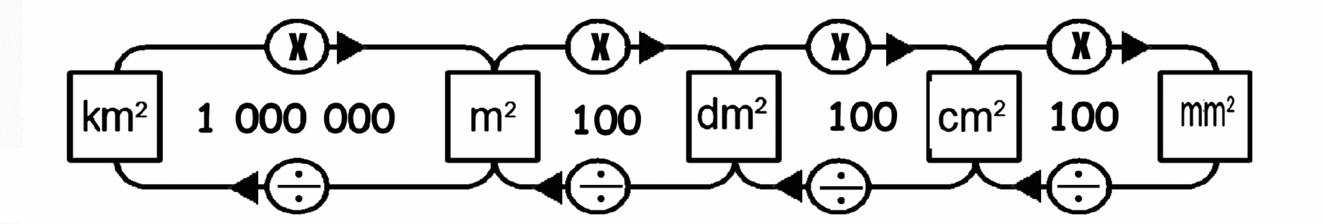
The area of a geometric figure is the number of equal parts forming a region

The square centimetre cm^2

is the area of a square of side length **1** cm



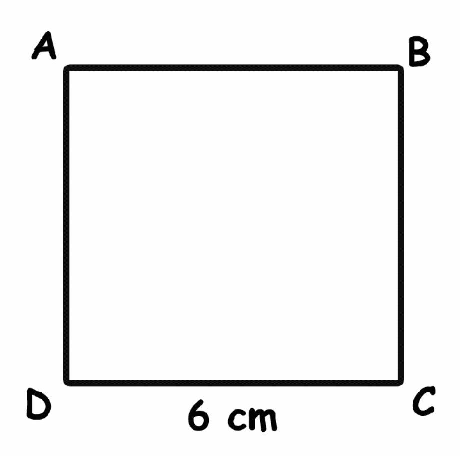
The square decimetre = 100 cm^2
The square metre = 100 dm^2 = 10 000 cm^2
the square kilometre = 1 000 000 m^2



The area of the square

= Side legnth X itself

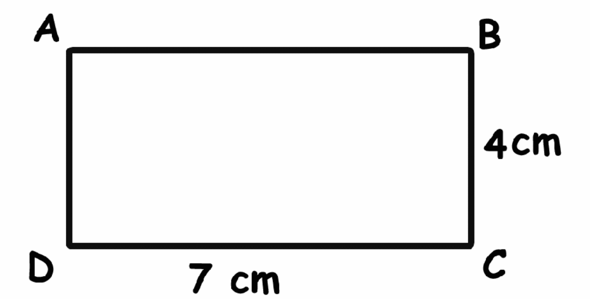
= 6 X 6 = 36 cm^2

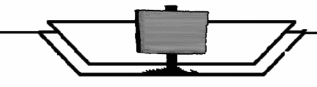


The area of the rectangle

= Length X width

= 7 X 4 = 28 cm^2



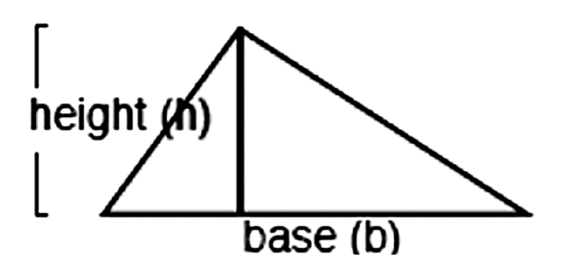


Area of a triangle

Area of a rectangle

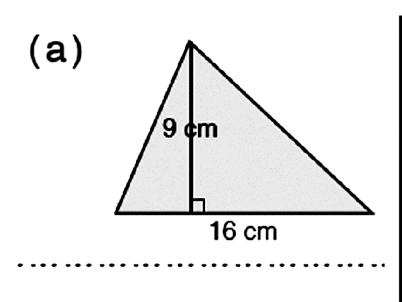
Area of a triangle $= \frac{1}{2} \times$ base $\times$ height

Formula: A $= \frac{1}{2} \times b \times h$



Find the area of each of the following triangles.

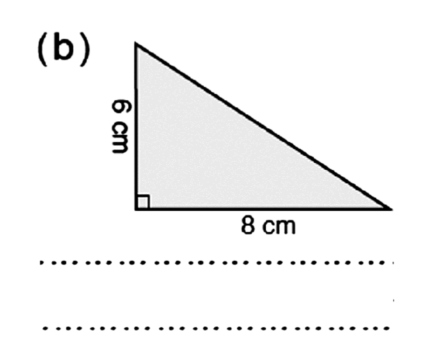
(a)



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……………………………………

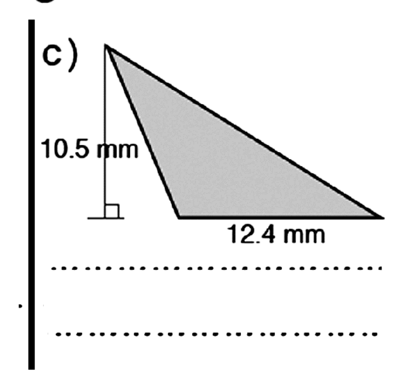
(b)



……………………………………

……………………………………

c)



……………………………………

……………………………………

Which is larger in area, a piece of land in the shape of a triangle with base 10 m and height 3 m or a garden in the shape of a square with side length 5 m?

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Calculate the area of an equilateral triangle if its perimeter is 27 cm and, its height is 7.8 cm.

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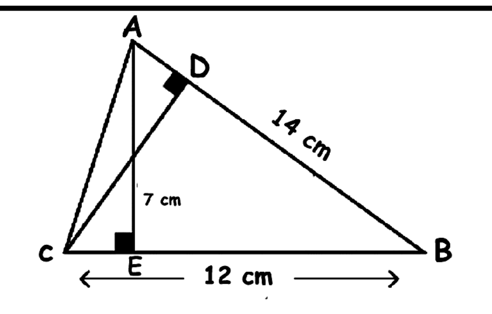
In the opposite figure :

[a] Find The area of the triangle ABC .

[b] Find the length of CD.

……………………………………………………………

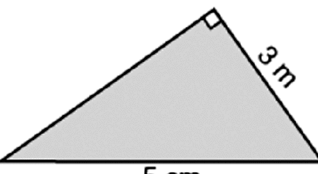
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Calculate the perimeter of the triangle opposite, if it its area is 6 cm^2.

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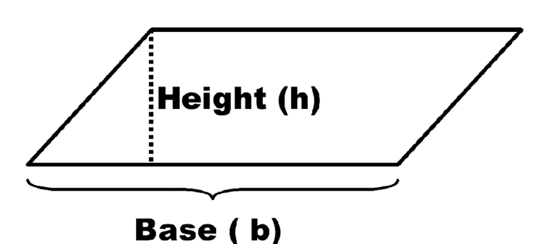




Lesson 2 Area of a parallelogram

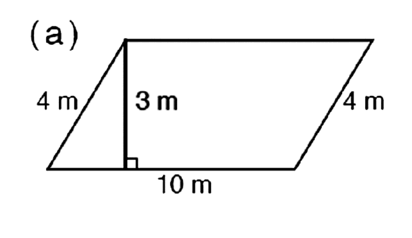
Area of a parallelogram = base × height

Formula: A = b × h



Find the area of each of the following parallelograms.

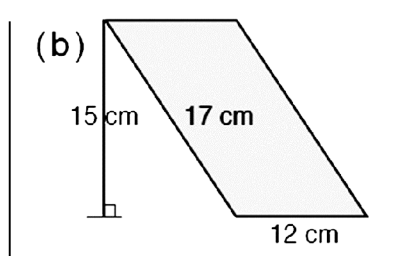
(a)



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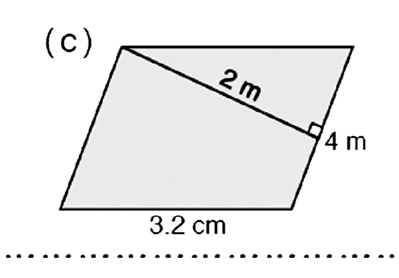
(b)



....

....

(c)



....

....

In the opposite figure find:

[a] The area of the parallelogram ABCD.

[b] The length of BC.

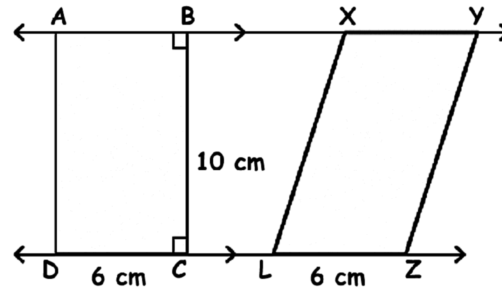
D A 2.8m 3.5 m 5m C B

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In the opposit figure AY // DZ , ABCD is a rectangle and XYZL is a parallelogram ,Compaire between their areas



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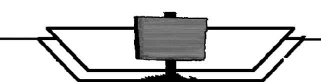
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ABCD is a parallelogram of area 375 cm², E is a point on $\overline{CD}$ find the area of the triangle AEB.

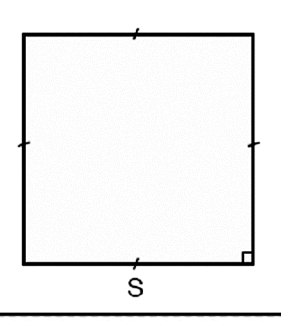
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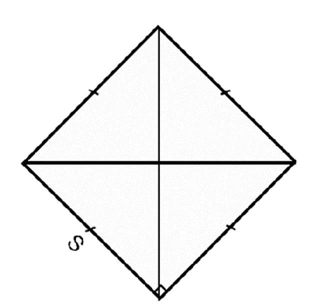


Lesson 3 Area of a Square



Area of a square = side length × itself

Formula: A = S × S

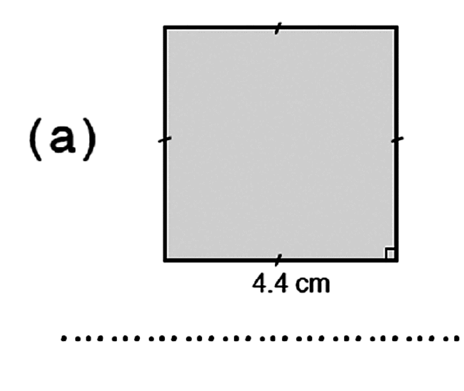


Area of the square = half the length of its diagonal × itself

Formula: A = $\frac{1}{2}$ d × d

Find the area of each of the following squares.

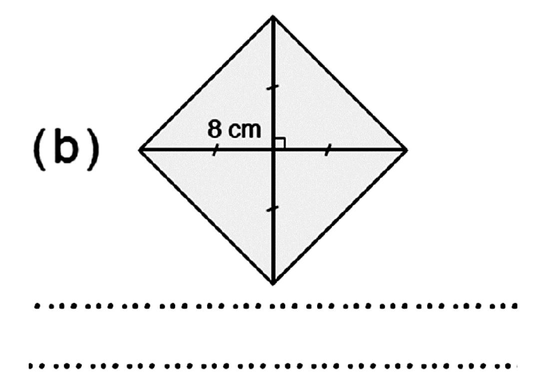
(a)



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....

(b)



....

....

The diagonal length of a square is 10 cm long. Find the area of the square. ....

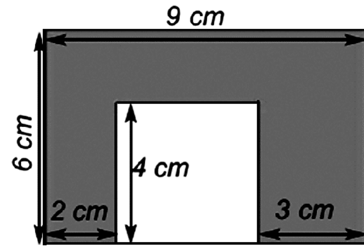
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The area of a square is 72 cm^2. Find the length of its diagonal.

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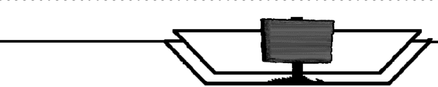
The figure opposite is a rectangle whose dimensions are 9 cm and 6 cm. A square of side length 4 cm is cut from it. Calculate: the area of the remaining part



....

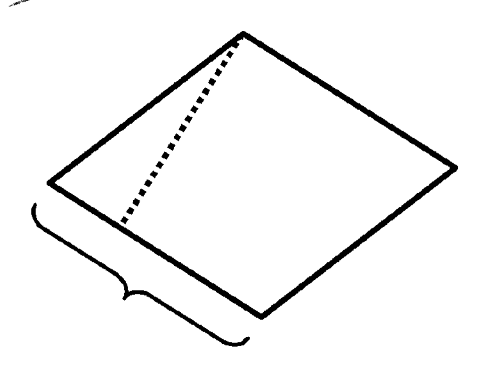
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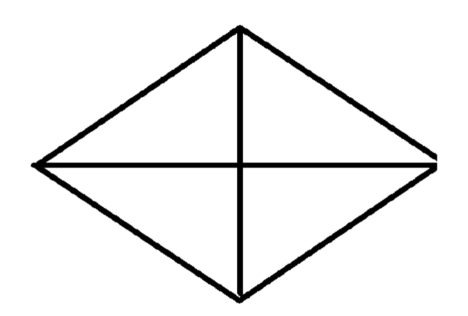
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Lesson 4 Area of a rhombus





Area of a rhombus = side length × height

Formula: A = L × h

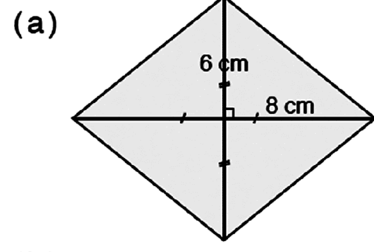
Area of a rhombus

= half the product of its diagonals

Formula: $A = \frac{1}{2} d_1 \times d_2$

Find the area of each of the following rhombuses.

(a)

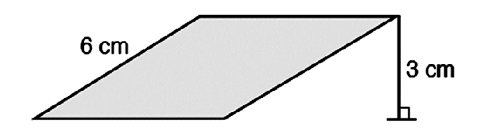


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(b)

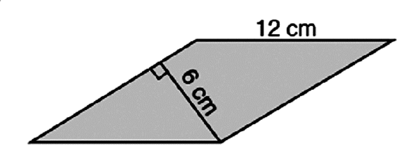


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....

....

(c)

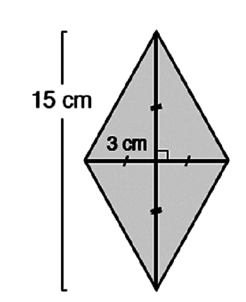


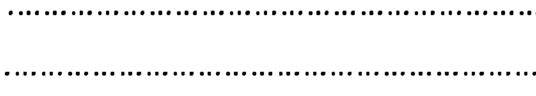
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(d)

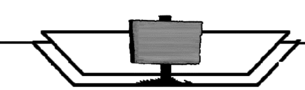




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The lengths of the diagonals of a rhombus are 24 cm and 10 cm. Calculate its area.

....

....

The lengths of the diagonals of a rhombus are 12 cm and 16 cm and its height is 9.6 cm. Find its side length.

....

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The side length of a rhombus is 5 cm, its height is 4.8 cm and the length of one of its diagonal is 6 cm. Calculate the length of the other diagonal.

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In the figure opposite, area of the rectangle ABCD equals 144 cm^2
IF AB = 8 cm, Calculate the area of the rhombus AFDE.

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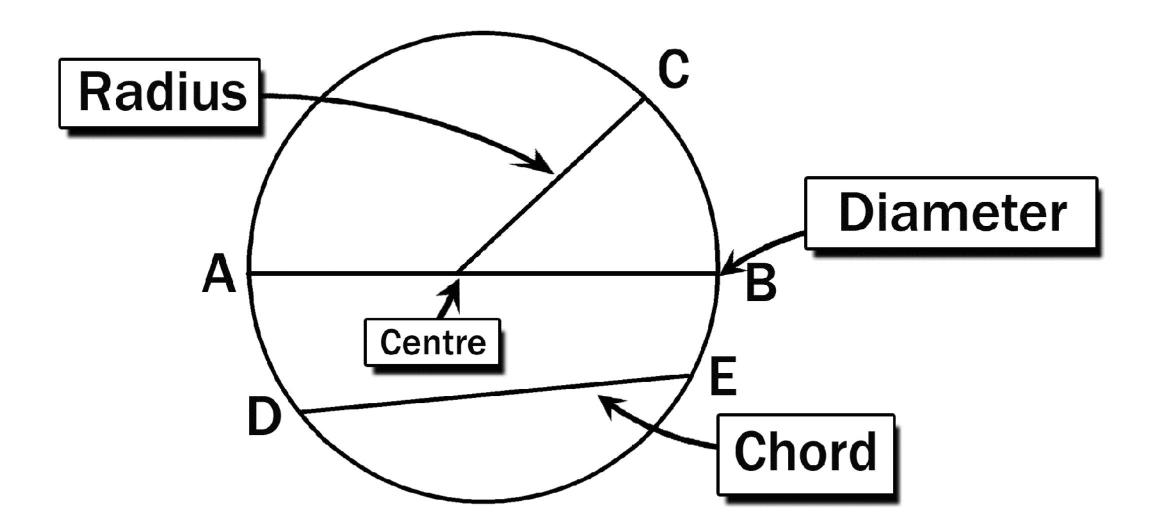
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E
D
M
A
8 cm
C
F
B



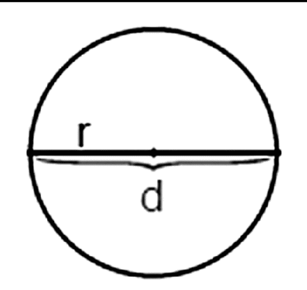
Lesson 5 Investigating circumference



Circumference = $\pi \times$ diameter

Formula : $C = \pi \times d = \pi \times 2r$

Where $\pi = 3.14$ (to the nearest hundredth).





π is the ratio between the circumference of the circle and the length of its diameter
It is named by the greek letter π pronounced "pie"

Find each circumference to the nearest whole number. "$\pi = 3.14$"

(a) d = 5 cm

....

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(b) r = 25 mm

....

....

Find each circumference to the nearest whole number. "$\pi = \frac{22}{7}$"

(a) d = 7 cm

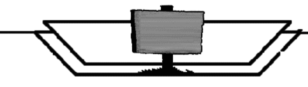
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(b) r = 14 m

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....





The radius of the tyre of Hazem's bicycle is 38 cm. Find the distance covered when the tyre of the bicycle makes 8 complete rotations. "$\pi = 3.14$"

....

....

....

Calculate the perimeter of the figure opposite, if AB = AC = 6 cm and the radius of the circle M equals 3.5 cm. "$\pi = \frac{22}{7}$"

A
C
M
B

....

....

....

A circle of circumference 66cm. Find the length of its diameter ($\pi = \frac{22}{7}$).

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If half the circumference of a circle equals 314 cm, find its diameter in metres ($\pi \simeq 3.14$).

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Geometric Transforations

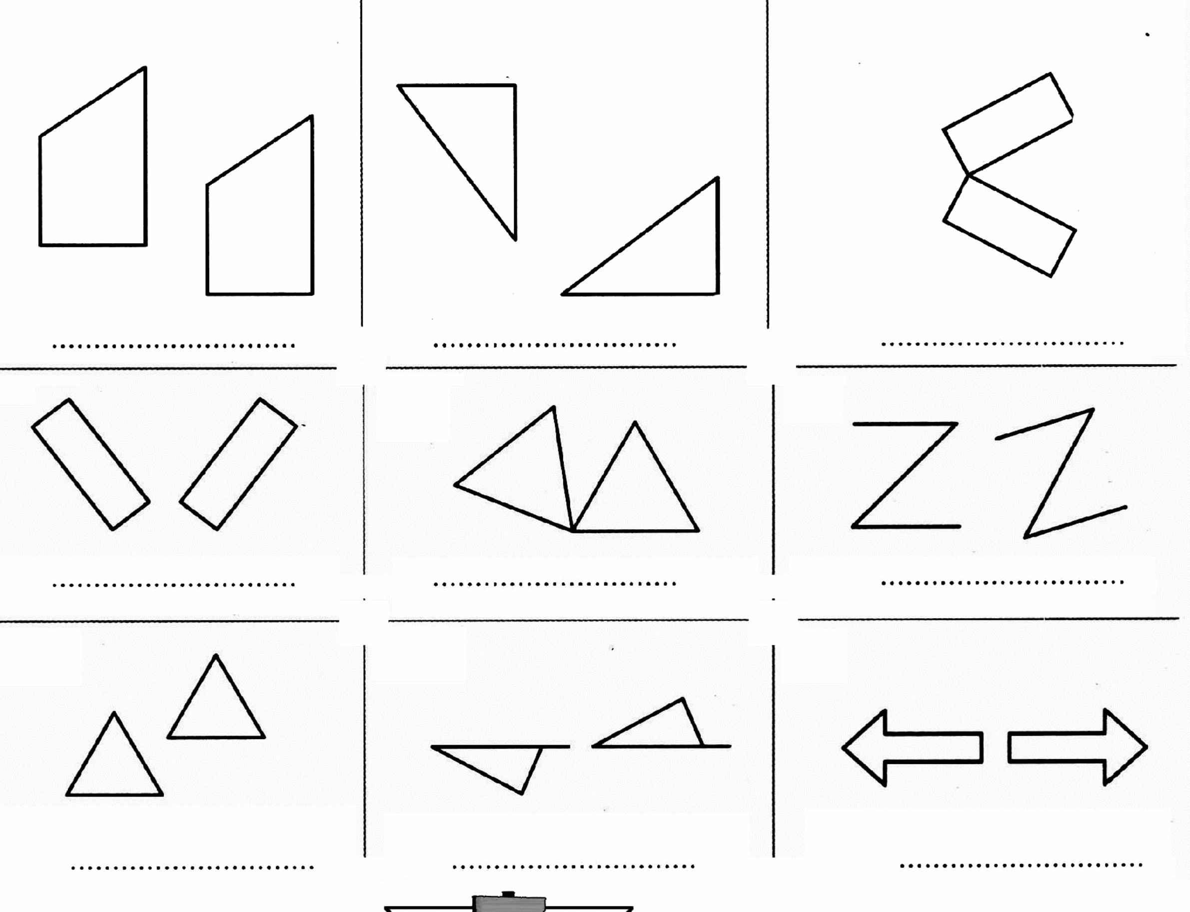
Lesson 1 Geometric transformations - Symmetrical figures and axis of Symmetry

Geometric transformations

A geometric transformation transforms every point A in the plane to another point À in the plane itself.

Geometric transformations	Reflection (flip) : Reflection is a over a line.	Translation (slide) : Translation is moving in a certain direction along a line.	Rotation (turn) : Rotation is turning the figure around a point with a certain angle.
For example			

Describe the type of transformation in each of the following figures (reflection , translation or rotation) :



Symmetrical figures and axis of Symmetry

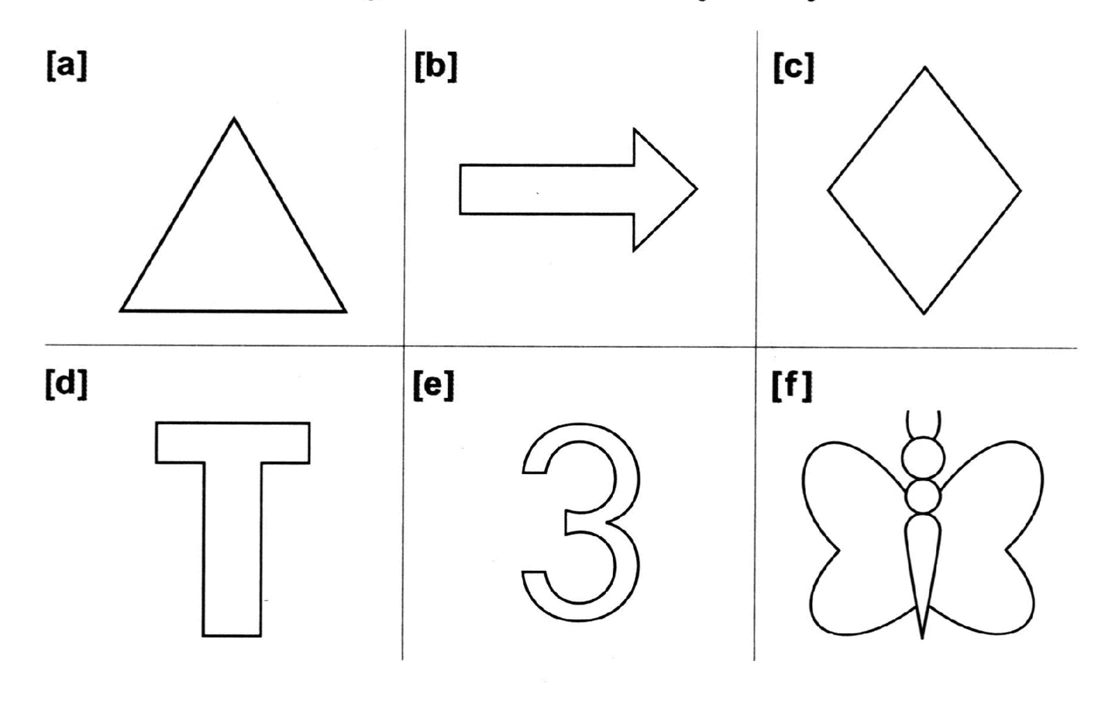
Axis of Symmetry

- Axis of symmetry is a straight line dividing the figure into two identical parts.
- The straight line L is considered to be an axis of symmetry for a figure, if every point on that figure has an identical point on the same figure, with respect to the line L.

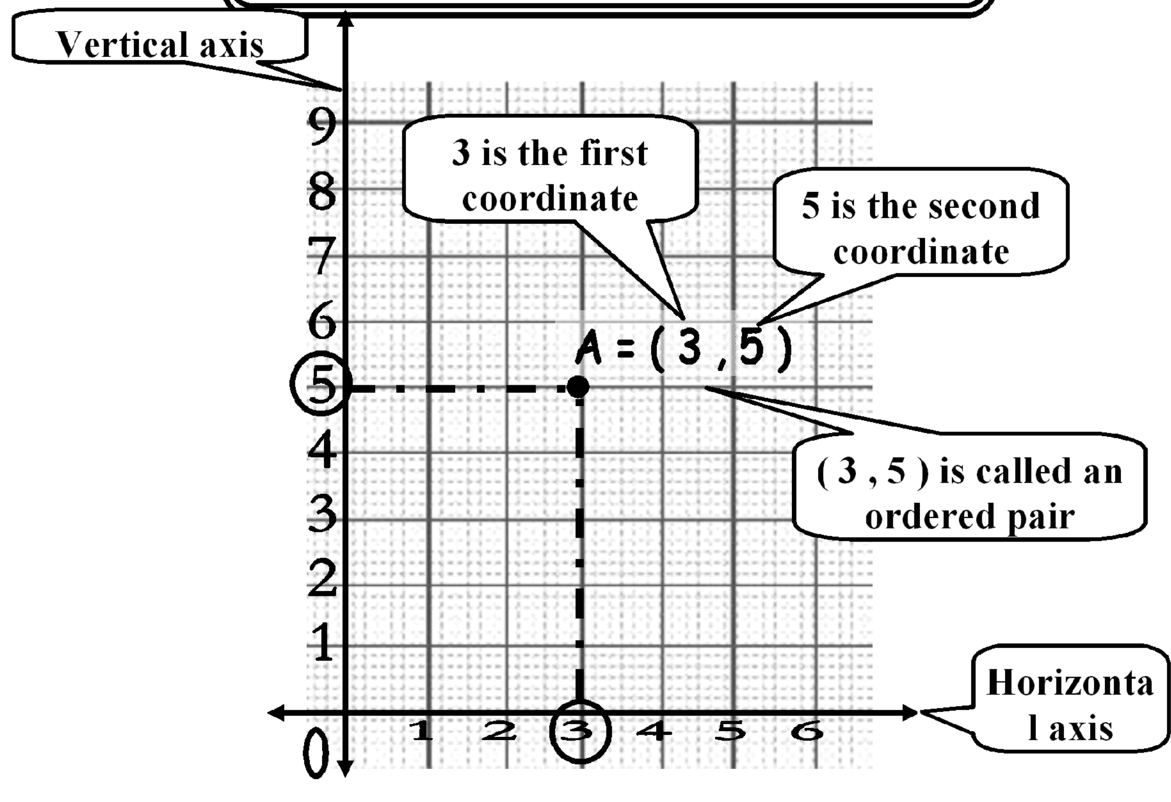
Axes of symmetry for some geometrical figures

The figure	Number of axes of symmetry	The figure	Number of axes of symmetry
Equilateral triangle	3	Isosceles triangle	1
Scalene triangle	0	Parallelogram	0
Rhombus	2	Rectangle	2
Square	4	Regular hexagon	6
Trapezium	0	Isosceles trapezium	1

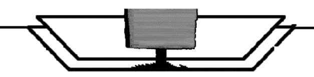
In each of the following, draw all the axes of symmetry :



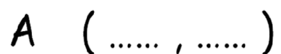
Two dimensions coordinate Plane and some geometric figures



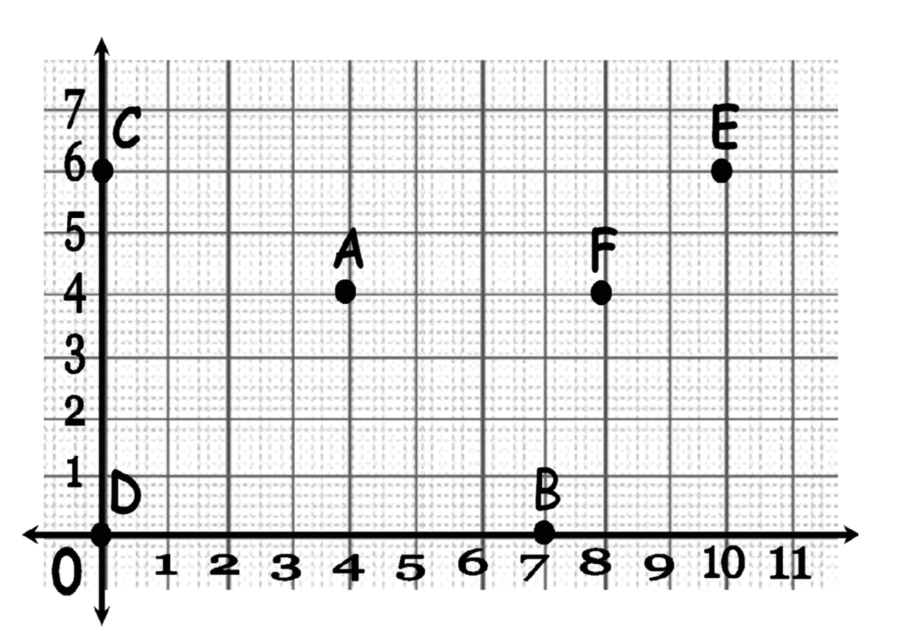
Every point in the two dimensional coordinal corresponds an ordered pair , and every ordered pair corresponds a point



On the 2-dimensional Coordinate plane . Find the coordinate of each of the points :

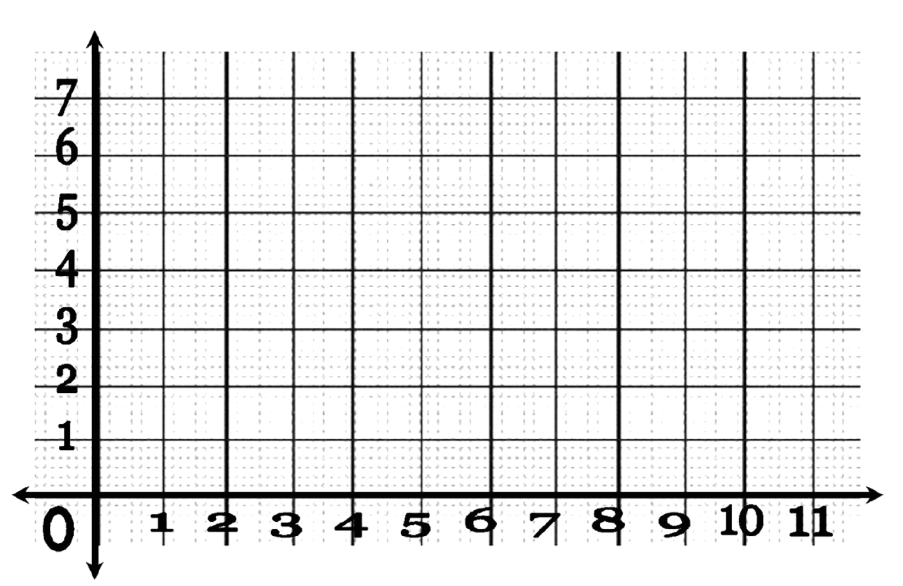


A (...... , ...)
B (...... , ...)
C ....
D ....
E ....
F ....



Put each ordered pair on the 2-dimensional coordinate plane :

A (5 , 6)
B (3 , 3)
C (0 , 0)
D (1 , 7)
E (0 , 6)
F (6 , 0)



Graph the points A (1 , 6) , B (2 , 2) , C (8 , 2) and D (7 , 6) , then connect them in order.

A → B → C → D → A

[a] What is the name of the figure ABCD ?

....

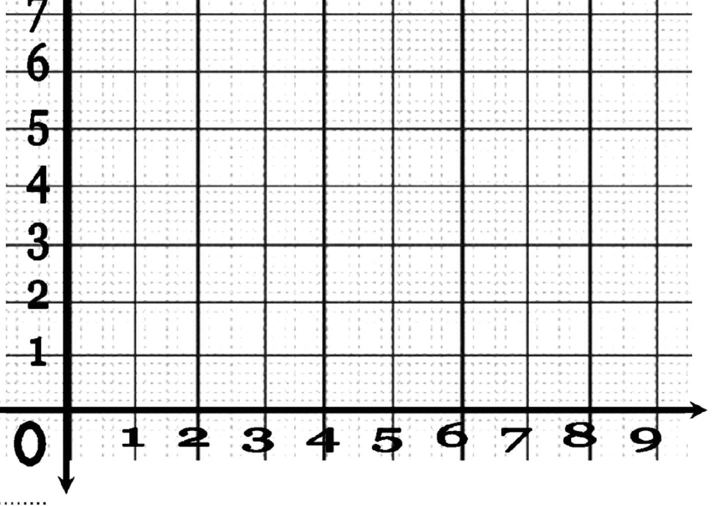
[b] What is the distance between A and D ?

....

[c] What is the length of $\overline{BC}$?

....

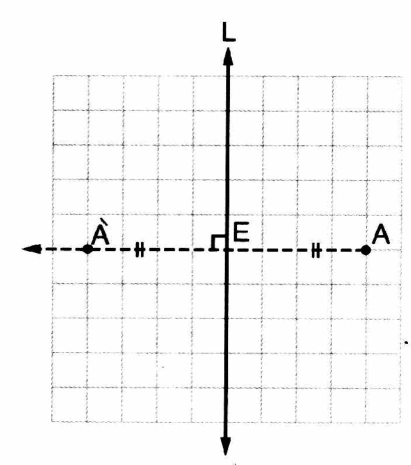
[d] What is the coordinates of the midpoint of $\overline{AD}$?...



Lesson 2 Reflection

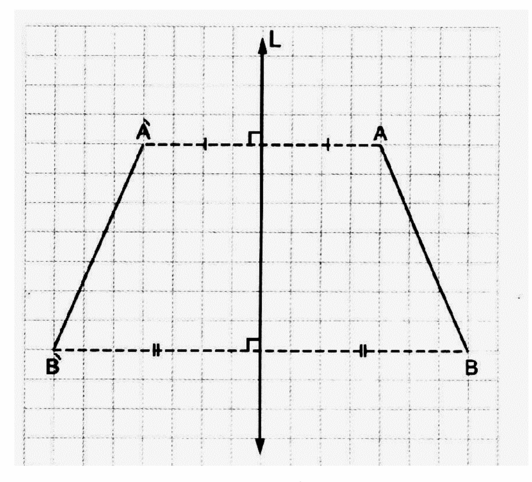
Reflection across a line

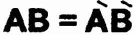
1 the image of a point by reflection across a line



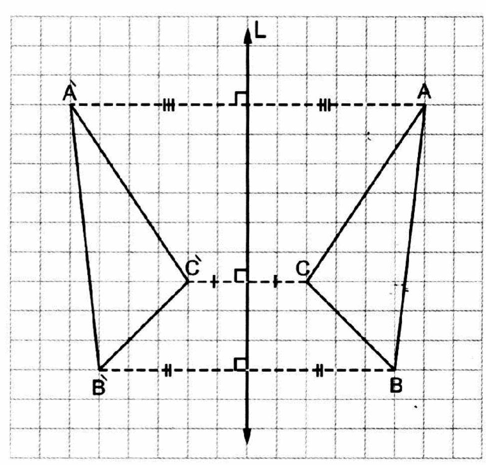
The line L is called the axis of reflection.

2 the image of a line segment by reflection across a line



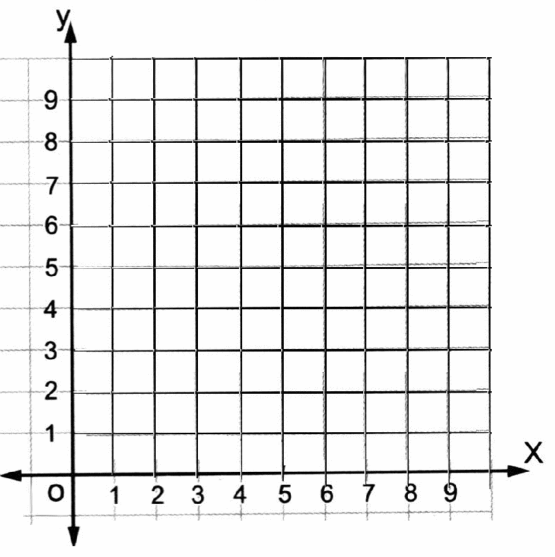


3 the image of a geometric figure by reflection across a line



- ÀB̀ = AB , B̀C̀ = BC , C̀À = CA ,
- m (∠ À) = m (∠ A) , m (∠ B̀) = m (∠ B) , m (∠ C̀) = m (∠ C).
- Δ ÀB̀C̀ is congruent to Δ ABC.

On the coordinate plane , draw the triangle ABC where A (2 , 1) , B (5 , 3) , and C (5 , 8) , then draw the image of it by reflection across $\overleftrightarrow{BC}$.

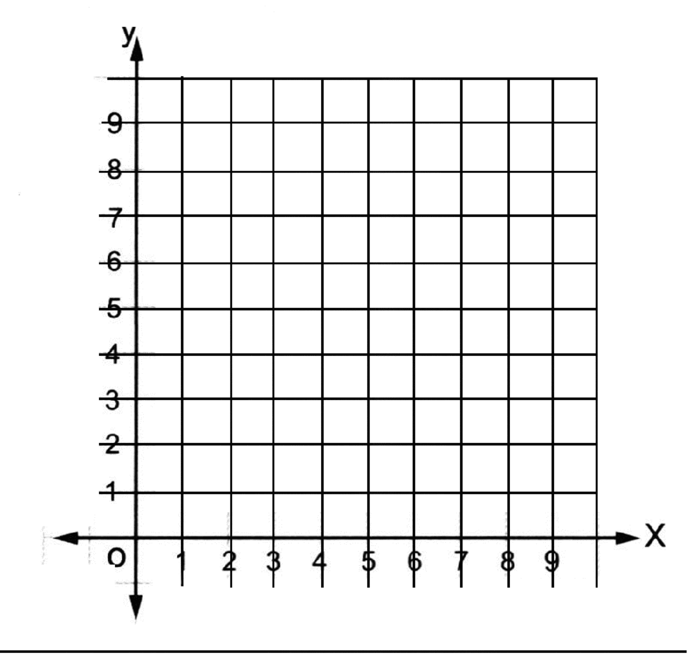


On the coordinate plane , draw the square ABCD where A (4 , 3) , B (7 , 3) , C (7 , 6) and D (4 , 6) , then draw its image ÀB̀C̀D̀ by reflection across $\overleftrightarrow{AD}$.

Complete :

À (..... , ...) , B̀ (..... , ...)

C̀ (..... , ...) , D̀ (..... , ...)

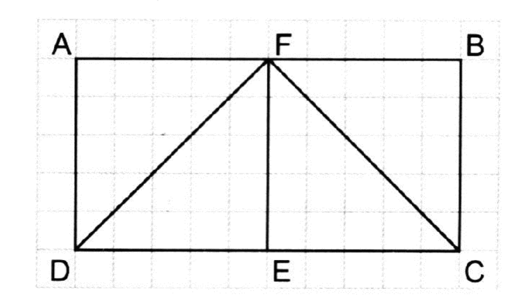


In the opposite figure , complete :

[a] The image of Δ CBF by reflection across $\overleftrightarrow{EF}$ is ....

[b] The image of Δ CBF by reflection across $\overleftrightarrow{CF}$ is ....

[c] Δ CEF is the image of Δ DEF by reflection across ....

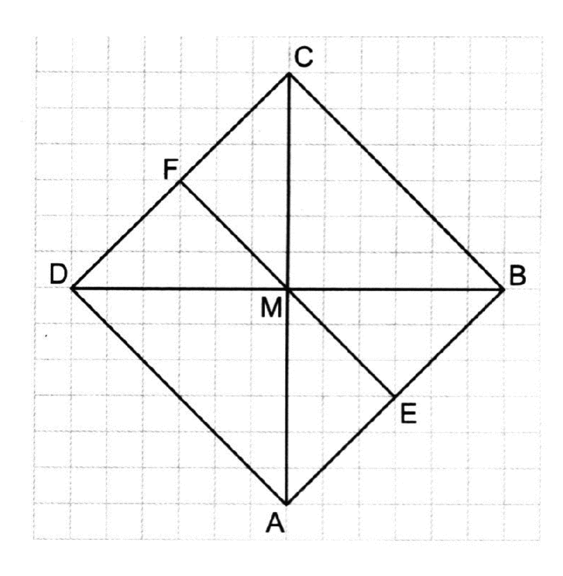


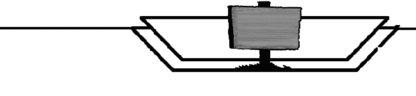
In the opposite figure , complete :

[a] The image of Δ BMC by reflection across $\overleftrightarrow{EF}$ is ....

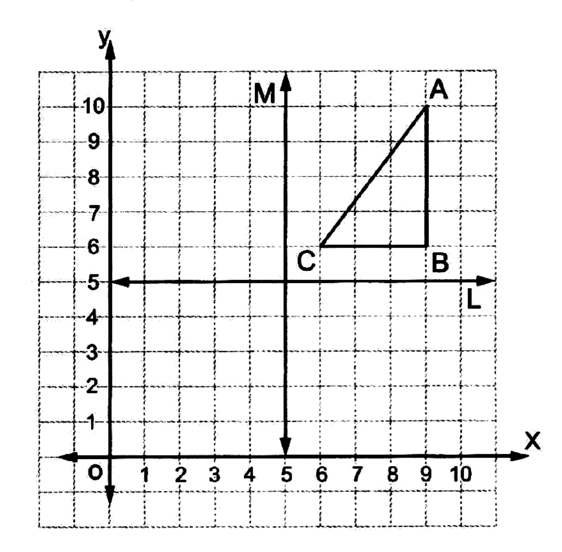
[b] The image of Δ DMF by reflection across $\overleftrightarrow{EF}$ is ....

[c] Δ ADM is the image of Δ ABM by reflection across ....





The opposite figure represents a coordinate plane :



(a) Write the coordinates of points A , B and C.

A ....

B ....

C. ....

(b) Draw Δ À B̀ C̀ the image of Δ ABC by reflection across (L) and determine the coordinates of the vertices À , B̀ and C̀.

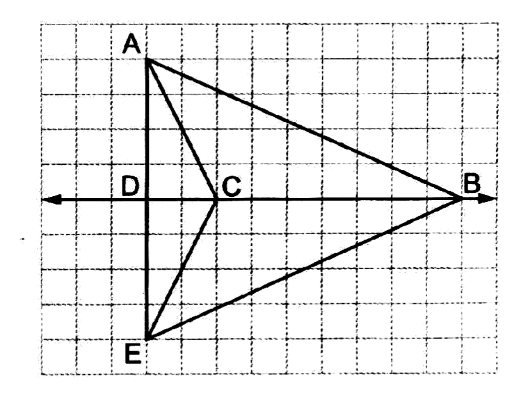
À .... , B̀ .... and C̀. ....

(c) Draw Δ A̎ B̎ C̎ the image of Δ ABC by reflection across (M) and determine the coordinates of its vertices A̎ , B̎ and C̎.

A̎ .... , B̎ .... and C̎. ....

In the opposite figure , $\overleftrightarrow{BD}$ is the axis of reflection.

Complete :



(a) The image of Δ ABC by reflection across $\overleftrightarrow{BD}$ is .... , then

AB = ... and AC = ...

(b) The image of Δ ACD by reflection across $\overleftrightarrow{BD}$ is .... , then

AD = ... and $\overline{CD}$ = ...

coincides on ....

(c) Δ ABC is congruent to Δ ....

and Δ ECD is congruent to Δ ....

Unit 5

Statistics

Lesson 3 Representing data by pie charts

The table shows how Laila spent her money on a holiday.

(a) Represent these data by a pie chart.

Accommodation	Food	Air-plane	Shopping
LE 1080	LE 540	LE 1080	LE 1620

(b) What did she spend most of her money on? ......

....

....

....

....

....

....

....

Ahmed had LE 900, He divided the sum of money among his mother and 3 sisters. The following table shows the amount of money each of them received.

(a) Complete the table.

(b) Represent these data by a pie chart.

Mother	Nancy	Mai	Sara
$\frac{1}{2}$	$\frac{1}{6}$		$\frac{1}{4}$

(c) How much money did Mai receive?

(d) How much money did Ahmed's mother receive?

....

....

....

....

....

....

....

....

Lesson 1 Collecting and organizing data

Using the following word:

abgedhawasshottlcalamonshaafass

(a) Complete the frequency table at the right using the name of the word.

Letter	Tally	Frequency
a	𝍸 |||	8
e	.....	.....
i	.....	.....
o	.....	.....
u	.....	.....

---

the number of letters in each of the first twenty - five words of a story are shown opposite. Make a frequency table.

6 3 4 2 3 5 3 7 3 4
3 3 4 3 3 3 6 6 3 5
3 2 3 7 5

number	Tally	Frequency
total		

The ages of 50 pupils are given opposite, present this information in a frequency table and a line graph.

15 12 12 13 14 13 12 14 14 13
12 15 16 14 14 13 14 12 12 13
14 13 13 13 12 14 15 14 15 13
14 14 13 14 12 13 14 15 14 13
12 16 14 13 13 12 14 12 14 15

Age	Tally	Frequency
	Total	



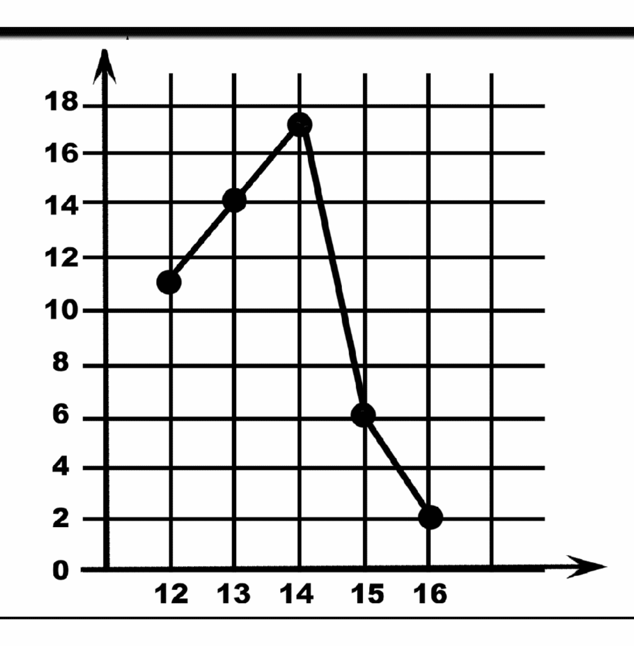
Lesson 2 Displaying data

Example

The ages of 50 pupils are given opposite, present this information in a frequency table and a line graph.

15	12	12	13	14	13	12	14	14	13
12	15	16	14	14	13	14	12	12	13
14	13	13	13	12	14	15	14	15	13
14	14	13	14	12	13	14	15	14	13
12	16	14	13	13	12	14	12	14	15

Age	Tally	Frequency
12	𝍸 𝍸 |	11
13	𝍸 𝍸 ||||	14
14	𝍸 𝍸 𝍸 ||	17
15	𝍸 |	6
16	||	2
	Total	50



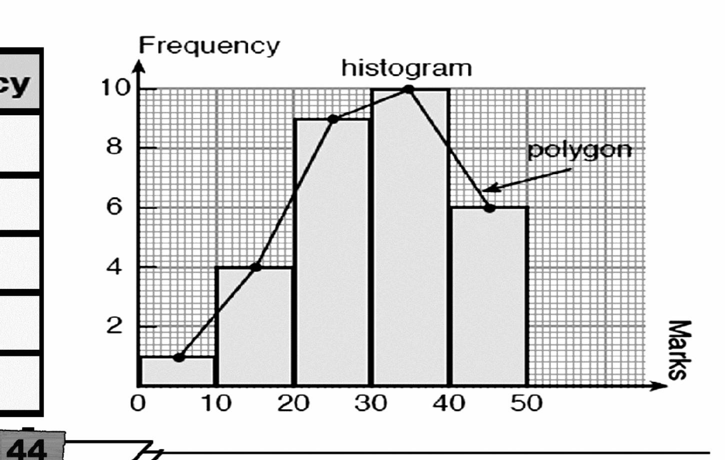
Thirty students in Mathematics task obtained the following marks out of a maximum of 50 marks.

38	39	29	14	46	17
48	45	19	43	49	12
43	39	22	21	37	36
22	21	30	31	35	37
23	22	27	33	9	22

Present this information in a frequency table and as a histogram and frequency polygon.

Using a class interval of 10:

Class	Class Centre	Frequency
- 10	5	1
- 20	15	4
- 30	25	9
- 40	35	10
- 50	45	6



A new car dealer asked forty of his customers how many years they kept their cars before selling them. The answers were:

8	1	3	5	4	4	4	6
5	6	4	4	3	5	3	5
4	4	5	2	6	5	3	4
2	8	4	4	5	6	4	7
4	7	5	8	3	3	5	2

(a) Complete the frequency table.

(b) Draw a line graph.

<table>
<tr><th>Age of car in years</th><th>Tally</th><th>Frequency</th></tr>
<tr><td>8</td><td>|||</td><td>3</td></tr>
<tr><td>7</td><td></td><td></td></tr>
<tr><td>6</td><td>||||</td><td></td></tr>
<tr><td>5</td><td>卌 ||</td><td>8</td></tr>
<tr><td>4</td><td></td><td></td></tr>
<tr><td>3</td><td></td><td></td></tr>
<tr><td>2</td><td>|||</td><td>3</td></tr>
<tr><td>1</td><td></td><td></td></tr>
<tr><td></td><td>Total</td><td>40</td></tr>
</table>

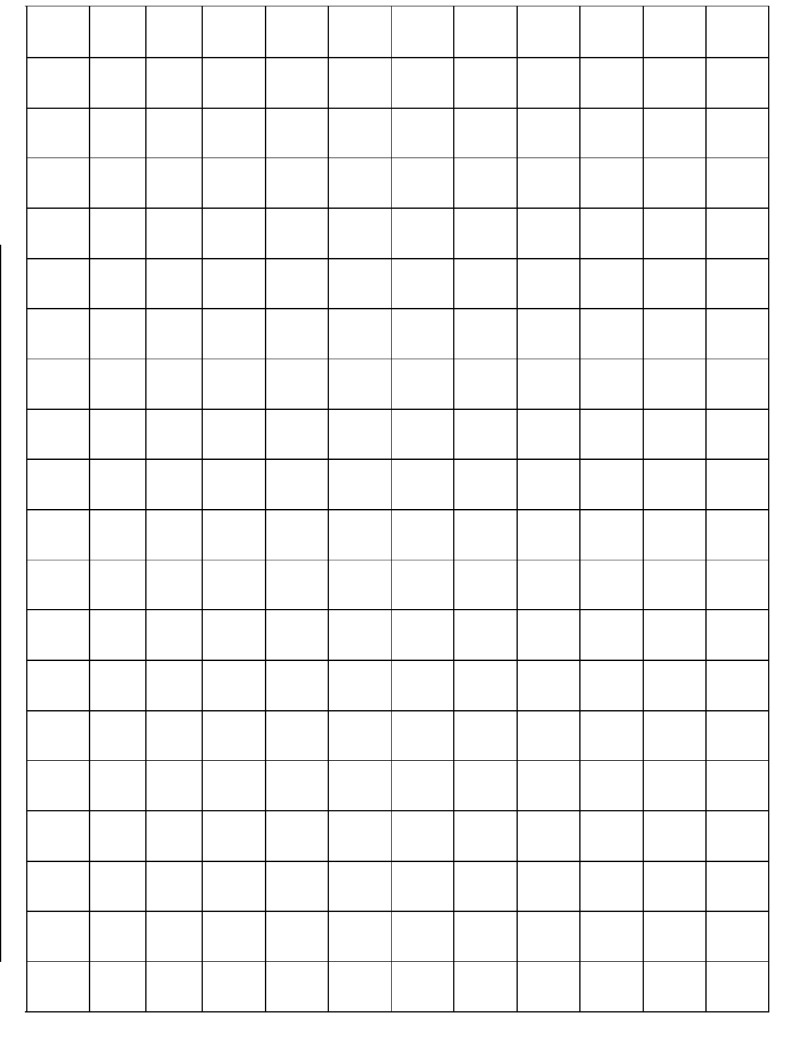
A class of 30 pupils had a 10 question task. The results were:

6	7	6	5.5	7	5	7	10	8	6
8	7	6.5	10	6	7	9	10	8	8.5
8	9.5	9	7	7.5	7.5	9	5	9	8

(a) Arrange these scores in a frequency table using the sets:
5 -, 6 - , ... , 10 -.

(b) Draw a histogram and a frequency polygon.

	Tally	Frequency



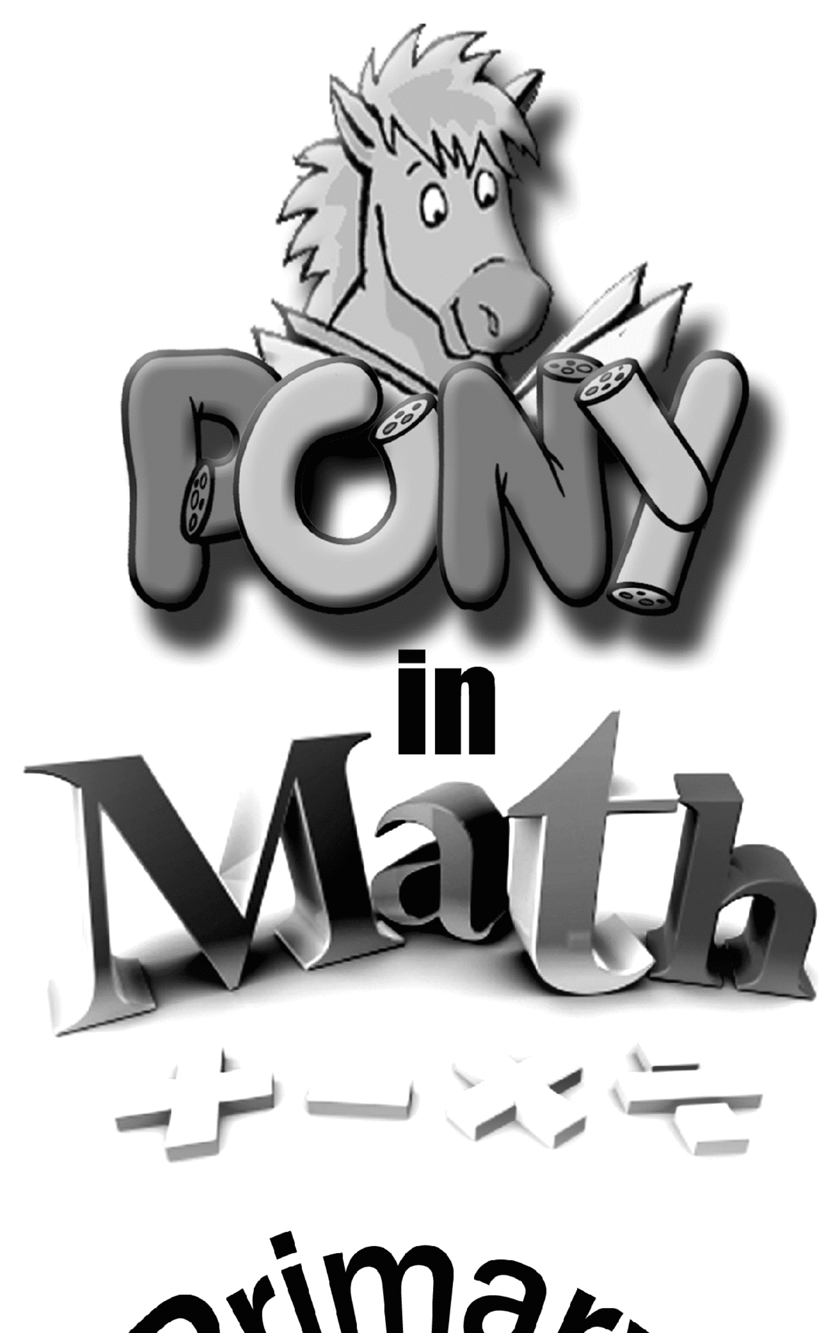
A survey team asked 100 persons chosen at random how many hours a week they watched TV.

Number of hours	0 -	5 -	10 -	15 -	20 -
Persons	6	24	54	12	4

Show this data by:

(a) a histogram

(b) a frequency polygon



Primary 5

SECOND TERM

Unit 1

Numbers and Operations



Exercises 1

In the Venn diagram, u is the universal set.

U = ……………………………………………………

M = ……………………………………………………

N = ……………………………………………………

M' = ………………………………………

N' = ………………………………………

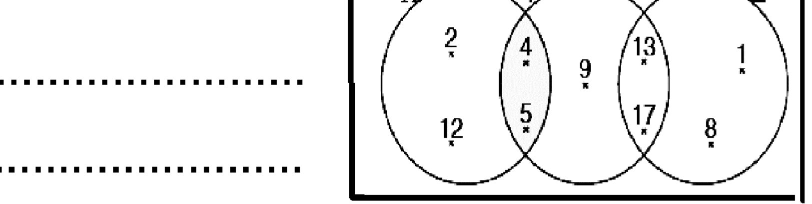
M ∪ N = ……………………………… M ∩ N = ………………………………

M – N = ……………………………… N – M = ………………………………

U – N = ……………………………… N – U = ………………………………

M – U = ……………………………… U – M = ………………………………

In the Venn diagram, u is the universal set.



U = ……………………………………………………

X = ……………………………………………………

Y = ……………………………………………………

Z = ……………………………………………………

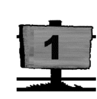
X' = ………………………………………

Y' = ……………………………………… Z' = ………………………………………

X ∪ Y = ……………………………… X ∩ Y = ………………………………

X ∪ Z = ……………………………… X ∩ Z = ………………………………

Z ∪ Y = ……………………………… Z ∩ Y = ………………………………





Complete using (∈ , ∉ , ⊂ , ⊄)

5	……	M	3	……	M			
8	……	N	6	……	N			
{ 2 , 5 }	……	M	{ 3 , 4 }	……	M			
{ 3 , 5 }	……	N	{ 4 , 7 }	……	N			
N	……	N	M	……	N			
U	……	U	N	……	U	{ 2 , 3 }	……	M
7	……	M	U	……	N	{ 6 , 8 }	……	N
7	……	N	U	……	M	M	……	U

Complete using (∈ , ∉ , ⊂ , ⊄)

5	….	{ 5 , 4 }	{ 5 , 4 }	……	{ 5 , 4 }	{ 1 , 2 }	……	{ 1 , 2 }
4	….	{ 54 }	{ 3 , 7 }	……	{ 6 ,4 }	{ 2 , 3 }	……	{ 1,2,3 }
9	….	{ 4 , 5 , 9 }	{ }	……	{ 65,45 }	{ 2 }	……	{ 2 , 3 , 4 }
7	….	{ 37 , 73 }	Ø	……	{ 6 , 2 }	2	……	{ 2 , 3 , 4 }
2	….	{ 22 , 32 }	{ 1 , 2 }	……	{ 12 , 21 }	12	……	{ 1 , 2 }
0	….	{ 10,50,20 }	{ 2 , 4 }	……	{ 2 , 3 , 4 }	12	……	{ 12 , 21 }
1	….	{ 1 , 2 , 3 }	{ 2 , 3 , 4 }	……	{ 2 , 4 }	0	……	{ }

Find the value of (x) in each of the following :

5	∈	{ 3 , 4 , x }	*Then* x = … … … … … … … … … … … … … …
x	∉	{ 3 , 4 , 5 , … }	*Then* x = … … … … … … … … … … … … … …
9	∈	{ 1 , 2 , x, 4 }	*Then* x = … … … … … … … … … … … … … …
{ 4 , 5 }	⊂	{ 2 , 3 , 4 , x }	*Then* x = … … … … … … … … … … … … … …
{ 3 , x , 5 }	⊂	{ 5 , 3 , 4 }	*Then* x = … … … … … … … … … … … … … …
{ 1 , 2 , 3 }	⊄	{ 3 , 2 , 4 , x }	*Then* x = … … … … … … … … … … … … … …

Exercises 2

1 **Underline the natural numbers from the following numbers :**

10 , 5.2 , 0 , 319 , $\frac{3}{4}$, 0.5 , 213

2 **Complete by using the suitable symbol from $\in$, $\notin$, $\subset$ or $\not\subset$:**

15 .... $\mathbb{N}$

{0} .... $\mathbb{N}$

0 .... $\mathbb{N}$

0.25 .... $\mathbb{N}$

{2 , 3} .... $\mathbb{N}$

{6 , 8 , 0.9} .... $\mathbb{N}$

$\varnothing$ .... $\mathbb{N}$

$\frac{15}{3}$ .... $\mathbb{N}$

{$\frac{4}{7}$} .... $\mathbb{N}$

{3 , 4 , 5 , ... , 30} .... $\mathbb{N}$

{3 , 7} $\cap$ {2 , 5} .... $\mathbb{N}$

{0} $\cup$ {1 , 2 , 3 , ...} .... $\mathbb{N}$

{0} .... the set of counting numbers.

{1 , 2 , 3} $\cup$ {2 , 5 , 7} .... the set of counting numbers.

The number of people in the world .... $\mathbb{N}$

3 **Complete each of the following :**

The least number of the counting numbers is ....

The least natural number is ....

The least even natural number is ....

The least odd natural number is ....

The least prime number is ....

4 **Write , using the listing method , each of the following sets of numbers :**

X = the set of natural numbers which are less than 6

X = ______________________________

Y = the set of natural numbers which are less than or equal to 5

Y = ______________________________

Z = the set of natural numbers which are greater than 3

Z = ______________________________





A = the set of natural numbers which are greater than or equal to 5

A = ____

B = the set of natural numbers between 2 and 7

B = ____

C = the set of natural numbers which are not less than 2 and not more than 7

C = ____

K = the set of even natural numbers which are less than 8

K = ____

H = the set of odd natural numbers between 15 and 25

H = ____

L = the set of prime numbers which are less than 10

L = ____

5 **Mark (✓) if the answer is a natural number and (✗) if not, giving reasons in each case :**

How many classes for grade 5 are there in your school ? ( )

How many villages are there in Upper Egypt ? ( )

How many pounds do you pay for 1 kilogram of tomatoes ? ( )

What is the number of people in your governorate ? ( )

What is the length of this piece of cloth ? ( )

How many books are there in your bag ? ( )

6 **Represent (graph) each of the following sets on the number line :**

$\{2, 3\}$

$\{4\}$

$\{2, 3, 4, 5, 6, 7\}$

$\{7, 9\} \cup \{8\}$

$\{4, 8, 9, 10\} - \{8, 10\}$

$\{4, 8, 12, 16, ...\}$

$\{2, 4, 7, 19\} \cap \{2, 4, 5, 9\}$



7 Complete :

The smallest natural number is ....

The smallest counting number ....

The least even natural number is ....

The least odd natural number is ....

The least prime number is ....

The natural numbers between 38 and 42 are ....

The only natural number between 17.4 and 18.4 is ....

The greatest 2-digit natural number is ....

The natural numbers between $5\frac{1}{3}$ and $9\frac{2}{7}$ are ....

The smallest natural number between $3\frac{1}{5}$ and 9.8 is ....

Between 10 and 103 there are .... natural numbers.

The natural numbers between $\frac{25}{6}$ and $\frac{27}{4}$ are ....

8 The following line-number graph shows 4 numbers a, b, c and d



Complete with < or >:

a .... b   c .... d   d .... a

a c   c .... b   d .... b

Exercises 3

1 Complete :

(a) 213 + 57 = 57 + ……… (……………………………… property)

(b) 149 + 673 = 673 + ……… (……………………………… property)

(c) 17 + ……… = ……… + 17 = 17 (……………………………… property)

(d) (6 + 8) + 9 = 6 + (……… + 9) (……………………………… property)

(e) (61 + 715) + 3 547 = ……… + (715 + 3 547) (……………………………… property)

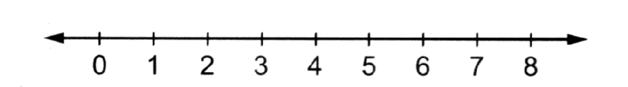
(f) a + ……… = b + ……… (……………………………… property)

(g) (……… + a) + b = c + (……… + b) (……………………………… property)

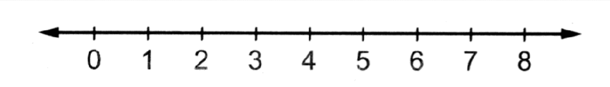
(h) 901 + ……… = 91 + ……… (……………………………… property)

2 Use the number line to add the following natural numbers :

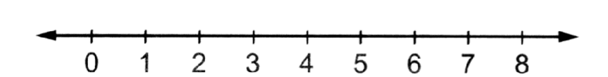
(a) 5 + 2 = ………



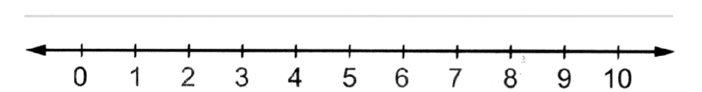
(b) 5 + 3 = ………

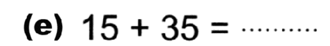


(c) 1 + 4 = ………

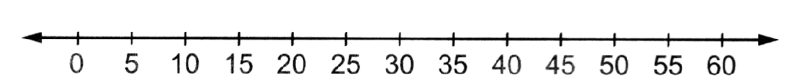


(d) 2 + 5 + 1 = ………



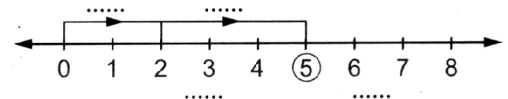


(e) 15 + 35 = ………

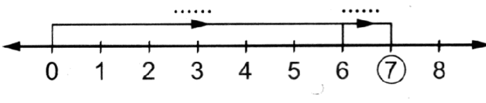


3 Observe the number line and complete :

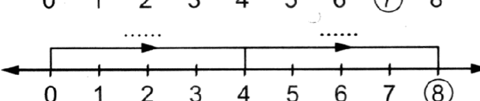
(a) 2 + ……… = 5



(b) ……… + 1 = 7



(c) ……… + ……… = ………



4 **Use the commutative and associative properties to simplify finding each of the following :**

(a) 28 + 15 + 72 = ………………………… ………………
= ………………………… ………………
= ………………………… ………………

(b) 34 + 48 + 66 = ………………………… ………………
= ………………………… ………………
= ………………………… ………………

(c) 76 + 15 + 85 + 24 = ………………………… ………………
= ………………………… ………………
= ………………………… ………………

(d) 81 + 43 + 19 + 57 = ………………………… ………………
= ………………………… ………………
= ………………………… ………………

(e) 38 + 46 + 62 + 54 + 79 = ………………………… ………………
= ………………………… ………………
= ………………………… ………………

(f) 672 + 665 + 335 + 328 = ………………………… ………………
= ………………………… ………………
= ………………………… ………………

(g) 53 + 62 + 75 + 47 + 25 + 38 = ………………………… ………………
= ………………………… ………………
= ………………………… ………………

5 **Complete the following expressions by using > or < or = :**

(a) 714 + 359 ……… 359 + 714

(b) 560 + 705 ……… 561 + 723

(c) (74 + 705) + 19 ……… 74 + (705 + 19)

(d) 1 248 + 890 ……… 1 247 + 890

(e) 17 248 + 0 ……… 17 248

(f) (802 + 65) + 19 ……… 19 + (65 + 801)



Exercises 4

1 Complete with = or ≠ :

(a) 35 – 28 ····· 28 – 35

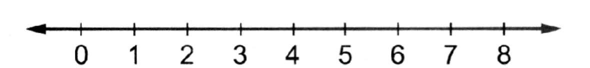
(b) 208 + 3 541 ····· 3 541 + 208

(c) (17 + 90) + 125 ····· 17 + (90 + 25)

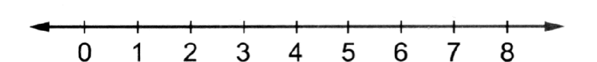
(d) (215 – 147) – 69 ····· 215 – (147 – 69)

2 Using the number line , calculate the following subtractions :

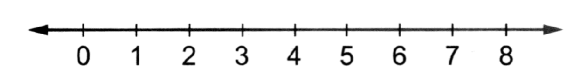
(a) 7 – 5 = ··········



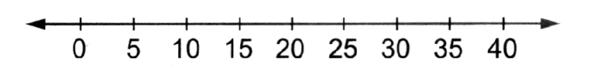
(b) 6 – 6 = ··········



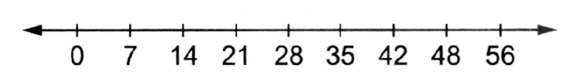
(c) 3 + 5 – 1 = ··········



(d) 35 – 15 = ··········

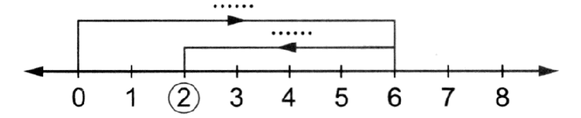


(e) 42 – 35 = ··········

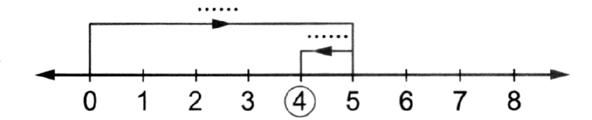


3 Observe the number line and complete :

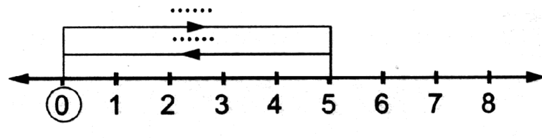
(a) 6 – ·········· = 2



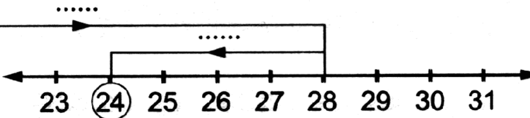
(b) ·········· – 1 = 4

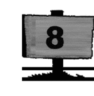


(c) ·········· – ·········· = ··········



(d) ·········· – ·········· = ··········







4 Using the number line , calculate :

62 – 5 = ...

56 57 58 59 60 61 62 63 64

63 – 36 = ...

0 9 18 27 36 45 56 63 72

5 Mention , stating reasons, which of the following subtractions are possible in $\mathbb{N}$:

7 – 1 ______________________

5 – 9 ______________________

4 – 4 ______________________

3 – 8 ______________________

0 – 0 ______________________

1 – 11 ______________________

6 Find :

(8 – 5) – 2 = ...
= ....

(12 – 7) – 3 = ...
= ....

8 – (5 – 2) = ...
= ....

12 – (7 – 3) = ...
= ....

Is the subtraction in $\mathbb{N}$ associative ? ....

7 Find if possible :

9 – 6 = ...
= ....

8 – 5 = ...
= ....

6 – 9 = ...
= ....

5 – 8 = ...
= ....

Is the subtraction in $\mathbb{N}$ commutative ?





Exercises 5

1 Complete :

(a) $47 \times 123 = 123 \times \ldots\ldots$

(b) $(12 \times 4) \times \ldots\ldots = 12 \times (4 \times 7)$

(c) $(83 \times 514) \times 96 = \ldots\ldots \times (514 \times 96)$

(d) $(\ldots\ldots \times 10) \times 5 = 20 \times (10 \times 5)$

(e) $\ldots\ldots \times 75 = 75 \times 1 = \ldots\ldots$

(f) $16 \times (54 + 71) = 16 \times 54 + 16 \times \ldots\ldots$

(g) $32 \times 9 + 32 \times 6 = \ldots\ldots \times (\ldots\ldots + \ldots\ldots)$

(h) $4 \times 10 \times 8 = \ldots\ldots \times 80 = \ldots\ldots$

(i) $3\,714 \times 0 = 0 \times \ldots\ldots = \ldots\ldots$

(j) $(9 \times 5) \times 8 = 9 \times \ldots\ldots = \ldots\ldots$

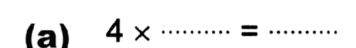
(k) $7 \times (4 + \ldots\ldots) = 7 \times 4 + 7 \times 5$

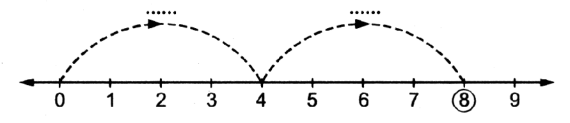
(l) $5 \times (1 + 4) = 5 \times \ldots\ldots + 5 \times \ldots\ldots$

(m) $50 \times (11 + 17) = \ldots\ldots \times \ldots\ldots + \ldots\ldots \times \ldots\ldots$

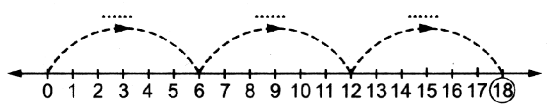
(n) $\ldots\ldots \times 1 = \ldots\ldots \times \ldots\ldots = 321$

2 Observe the number line and complete :

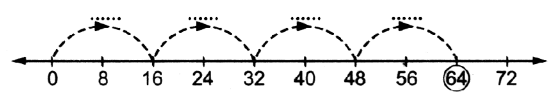
(a)  $4 \times \ldots\ldots = \ldots\ldots$



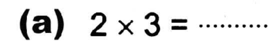
(b) $\ldots\ldots \times \ldots\ldots = \ldots\ldots$

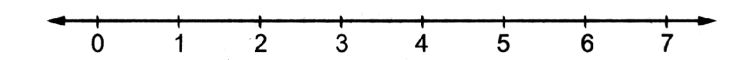


(c) $\ldots\ldots \times \ldots\ldots = \ldots\ldots$

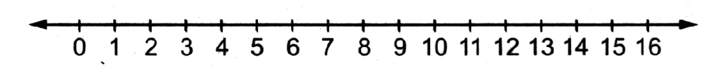


3 Using the number line , calculate the following multiplications :

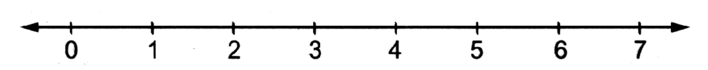
(a)  $2 \times 3 = \ldots\ldots$



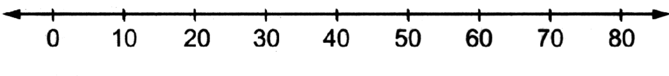
(b) $4 \times 4 = \ldots\ldots$



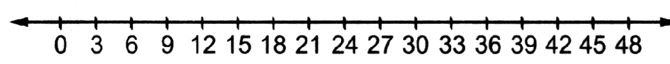
(c) $4 \times 1 = \ldots\ldots$



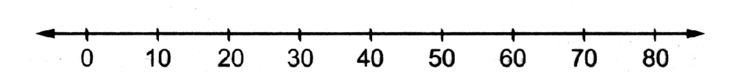
(d) $10 \times 7 = \ldots\ldots$



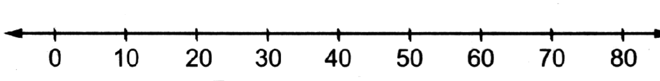
(e) $6 \times 7 = \ldots\ldots$



(f) $5 \times 11 = \ldots\ldots$



(g) $2 \times 5 \times 6 = \ldots\ldots$





4 **Use the distributive property to simplify finding the result of each of the following :**

$35 \times 64 + 35 \times 36$

= ……………………………………

= ……………………………………

= ……………………………………

$37 \times 73 + 63 \times 73$

= ……………………………………

= ……………………………………

= ……………………………………

$15 \times 45 + 15 \times 55$

= ……………………………………

= ……………………………………

= ……………………………………

$143 \times 499 + 143 \times 501$

= ……………………………………

= ……………………………………

= ……………………………………

$87 \times 43 - 37 \times 43$

= ……………………………………

= ……………………………………

= ……………………………………

$59 \times 67 - 59 \times 57$

= ……………………………………

= ……………………………………

= ……………………………………

$24 \times 37 + 24 \times 35 + 24 \times 28$

= ……………………………………

= ……………………………………

= ……………………………………

$15 \times 23 + 25 \times 23 + 60 \times 23$

= ……………………………………

= ……………………………………

= ……………………………………

5 **Use the commutative and associative properties to simplify finding the result of each of the following :**

$25 \times 37 \times 4$ = ……………………………

= ……………………………

= ……………………………

$8 \times 78 \times 125$ = ……………………………

= ……………………………

= ……………………………

$25 \times 20 \times 16$ = ……………………………

= ……………………………

= ……………………………

$16 \times 75 \times 125$ = ……………………………

= ……………………………

= ……………………………

$3 \times 25 \times 75 \times 4$ = ……………………………

= ……………………………

= ……………………………

$16 \times 5 \times 25 \times 6$ = ……………………………

= ……………………………

= ……………………………

$8 \times 4 \times 125 \times 15$ = ……………………………

= ……………………………

= ……………………………

$32 \times 75 \times 8 \times 25$ = ……………………………

= ……………………………

= ……………………………

6 **Use the distributive property to find the value of each of the following :**

52×101 = ………………………………
= ………………………………
= ………………………………

74×99 = ………………………………
= ………………………………
= ………………………………

502×45 = ………………………………
= ………………………………
= ………………………………

25×427 = ………………………………
= ………………………………
= ………………………………

15×284 = ………………………………
= ………………………………
= ………………………………

Name each of the following properties

(a) For any two natural numbers a and b, their sum (a + b) is also a natural number. ………………………………

(b) For any two natural numbers a and b, a + b = b +a ………………………………

(c) For any three natural numbers a, b and c, we have a + (b + c) = (a + b) + c ………………………………

(d) For any natural number a, we have a + 0 = 0 + a = a ………………………………

(e) For any two natural numbers a and b, their product a × b is also a natural number. ………………………………

(f) For any two natural numbers a and b, we have a × b = b × a ………………………………

(g) For any three natural numbers a, b and c, we have a × (b × c) = (a × b) × c ………………………………

(h) For any natural number a, we have a × 1 = 1 × a = a ………………………………

(i) For any three natural numbers a, b, and c, we have a × (b + c) = (a × b) + (a × c) ………………………………





Exercises 6

1 Put the sign (✓) in the suitable place as in (a) :

The operation	is possible in $\mathbb{N}$	is not possible in $\mathbb{N}$
20 ÷ 5	✓	
27 ÷ 9		
2 ÷ 5		
10 ÷ 10		
5 ÷ 20		
1 ÷ 7		
12 ÷ 0		
0 ÷ 3		
9 ÷ 36		

2 Complete with $\in$ or $\notin$:

a (4 ÷ 2) .... $\mathbb{N}$

b (0 ÷ 4) .... $\mathbb{N}$

c (4 × 2) .... $\mathbb{N}$

d (3 ÷ 4) .... $\mathbb{N}$

e (18 ÷ 4) .... $\mathbb{N}$

f (12 ÷ 3) .... $\mathbb{N}$

g (7 ÷ 0) .... $\mathbb{N}$

h (3 + 7) .... $\mathbb{N}$

i (17 ÷ 5) .... $\mathbb{N}$

j (88 ÷ 11) .... $\mathbb{N}$

k (512 + 247) .... $\mathbb{N}$

l (18 – 25) .... $\mathbb{N}$

m (7 ÷ 7) .... $\mathbb{N}$

n (25 ÷ 1) .... $\mathbb{N}$

o [(6 × 3) ÷ 9] .... $\mathbb{N}$

p [(5 × 6) ÷ 12] .... $\mathbb{N}$

q [(6 ÷ 3) × 5] .... $\mathbb{N}$

r [(2 ÷ 4) × 11] .... $\mathbb{N}$

s [(7 + 13) ÷ 0] .... $\mathbb{N}$

t [(0 ÷ (41 – 22)] .... $\mathbb{N}$



3 Choose the correct answer :

a $35 \div 7$ .... $\mathbb{N}$ ($\in$ or $\notin$ or $\subset$ or $\not\subset$)

b $\frac{0}{5}$ = ... (0 or 1 or 5 or has no meaning)

c $\frac{7}{0}$ = ... (0 or 1 or 7 or has no meaning)

d $(8 + 6) \div 2$ = ... (8 or 7 or 6 or 2)

e $75 \div (5 \times 3)$ = ... (5 or 3 or 15 or 75)

4 Mark (✓) for the correct statements and (✗) for the incorrect ones :

a The set of natural numbers is closed under the division. ( )

b $(36 \div 6) \div 3 = 36 \div (6 \div 3)$ ( )

c We can divide any natural number by zero. ( )

d The division operation of natural numbers is associative. ( )

e $12 \div 6 = 6 \div 12$ ( )

f $40 \div (8 + 2) = (40 \div 8) + (40 \div 2)$ ( )

g $(28 \div 6) \in \mathbb{N}$ ( )

5 Complete with (is equal to zero) or (is meaningless) :

a $(0 \div 10)$ ....

b $(5 \div 0)$ ....

c $(518 - 518)$ ....

d (23×0) ....

e $(90 \div 0)$ ....

f $\frac{64 - 64}{5}$ ....

g $\frac{0}{100 - 50}$ ....

h $\frac{27 - 15}{5 - 5}$ ....

i $\frac{117 - 117}{15 - 15}$ ....

6 Find the value of $(16 \div 8) \div 2$, $16 \div (8 \div 2)$.

Is the statement $(16 \div 8) \div 2 = 16 \div (8 \div 2)$ true ?

Does the associative property hold for division ?

....

....

....

....

....



Complete in the same pattern :

(a) 2 , 4 , 8 , 16 , ... , ...

(b) 5 , 7 , 9 , 11 , ... , ...

(c) 1 , 4 , 7 , 10 , ... , ...

(d) 2 , 6 , 18 , 54 , ... , ...

(e) 2 , 7 , 12 , 17 , ... , ...

(f) 2 , 8 , 32 , ... , ...

(g) 1 , 3 , 9 , 27 , ... , ...

(h) 5 , 15 , 25 , 35 , ... , ...

(i) 12 , 10 , 8 , 6 , ... , ...

(j) 95 , 80 , 65 , 50 , ... , ...

(k) 1 , 2 , 4 , 7 , ... , ...

(l) 1 , 4 , 8 , 13 , ... , ...

(m) 2 , 5 , 10 , 17 , 26 , ... , ...

(n) 25 , 20 , 16 , 13 , ... , ...

(o) 142 , 143 , 145 , 148 , 152 , ...

(p) 89 , 79 , 70 , 62 , 55 , ...

(q) 18 , 9 , 4.5 , ... , ...

(r) 1 , 1 , 2 , 3 , 5 , 8 , ... , ...

(s) 7 , 77 , 777 , 7777 , ... , ...

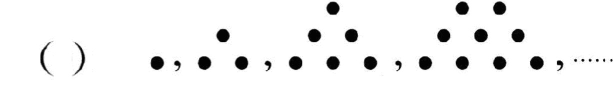
(t) 1×1 , 2×2 , 3×3 , 4×4 , ... , ...

(u) 1×2 , 2×4 , 3×8 , ... , ...

(v) .... , ... , 8 , 11 , 14 , ... , ...

(w) .... , ... , 12 , 24 , 48 , ... , ...

( ) •, ⁘ , ⁘⁘ , ...

( )  ....

Sherine sold a discount card that gives a discount to its owner at some fast food restaurants for L.E. 38. If the price of the card had increased L.E. 4 annually during her owning to the card for 4 years. How much did she spend to buy this card ?

....

....

Hany has 3 test rabbits in his lab. If the number of rabbits is doubled each certain period. How many rabbits will be there in 5 periods ?

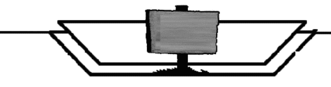
....

....

Dina paid L.E. 34 for her annual membership card in a science club. Dina told her friend Hanaa that this amount is increased by L.E. 11 annually. How much will it be after 10 years ?

....

....



Unit 2

Equations

Mathematical expressions

Complete using a suitable symbolic expression :

(a) Add 6 to the number x , the symbolic expression is ....

(b) Subtract 3 from the number y , the symbolic expression is ....

(c) Multiply 5 by the number z , the symbolic expression is ....

(d) Divide the number m by 3 , the symbolic expression is ....

(e) Add 3 to the double of the number x ....

(f) Subtract 5 from the double of the number y ....

(g) Add 7 to three times of the number z ....

(h) Subtract 3 from the half of the number x ....

(i) Add 6 to one third of the number z ....

Translate into symbolic expression :

(a) Add a number z to 36 ....

(b) Five less than a number x ....

(c) Nine more than a number x ....

(d) Subtract a number t from 24 ....

(e) Three times a number y ....

(f) Product of a number p and 7.5 ....

(g) Quotient of a number h by q ....

(h) Nine divided by a number x ....

(i) Seventy nine multiplied by a number v ....

(j) Take away a number k from 18 ....

(k) Seven increased by a number s ....

(l) A number w decreased by 5 ....

(m) Difference of a number h and 15 , where h is greater than 15 ....

(n) Three fifth a number n ....

(o) Divide the number x by 5 , and add 5 to the quotient. ....

Translate into symbolic expression :

(a) Subtract 8 from a number

(b) Add 5 to the three times of a number.

(c) Add 4 to the half of a number.

(d) Subtract 7 from one third of a number.

(e) 7 is added to the double of a number.

Choose the correct answer :

(a) If we subtract 5 from the number x , we get ………
($5x$ or $5-x$ or $x-5$ or $x+5$)

(b) Suzan saved L.E. x and her father gave her L.E. 10
she will have ……… ($x-10$ or $x+10$ or $10x$ or $10-x$)

(c) Subtracting 3 from double of the number x = ………
($x-3$ or $2x-3$ or $3x+2$ or $5x$)

(d) The difference between three times a number and two is ………
($3x+2$ or $3x-2$ or $2\times3x$ or $\frac{3x}{2}$)

(e) If three times a number is added to 12 , then the expression that expresses this is ………
($x+12$ or $x-12$ or $3x+12$ or $3x-12$)

(f) Twice the sum of a number and five is ………
($2x+5$ or $2x-5$ or $2(x+5)$ or $2(x-5)$)

(g) Bassem is x years old now , how old will he be after 5 years ?
($5x$ or $5\div x$ or $x-5$ or $x+5$)

(h) What operations are in the symbolic expression for "twice a number increased by three" ?
(+ and – or × and – or × and + or × , + and –)

---

7 Write each symbolic expression in words :

(a) $n-5$ ………………………………

(c) $c+15$ ………………………………

(b) $\frac{f}{3}$ ………………………………

(d) $5x$ ………………………………

Write down a mathematical relation between x and y for each of the following :

(a) If the number y is nine times the number x ....

(b) If the number y is five more than the number x ....

(c) If the number x is the quotient of the number y by 3 ....

(d) If the number x is seven less than the number y ....

(e) If the number x is 9 more than the double of y ....

(f) If the number y is twice the sum of the number x and 8 ....

Choose the correct answer :

(a) If the sum of two numbers x and y is 20 , then y = ...

($20 + x$ *or* $20 - x$ *or* $x - 20$ *or* $\frac{x}{20}$)

(b) If the product of two numbers x and y is 10 , then y = ...

($10\,x$ *or* $\frac{x}{10}$ *or* $\frac{10}{x}$ *or* $x + 10$)

(c) The sum of two numbers x and y is 15 , the smaller number is x , then y = ...

($15 - x$ *or* $x - 15$ *or* $x + 15$ *or* $15\,x$)

(d) The difference of two numbers is 7 , and the smaller number is y , then the greater number will be ....

($7\,y$ *or* $7 - y$ *or* $y - 7$ *or* $y + 7$)

(e) x and y are two numbers. The greater number is 3 more than the other. If the smaller number is y , then x = ...

($3\,y$ *or* $y - 3$ *or* $y + 3$ *or* $\frac{1}{3}\,y$)

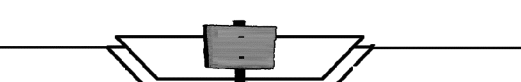
(f) If Ahmed has L.E. 25 , and what Esslam has is less than what Ahmed has by L.E. x , then Esslam has ....

($x + 25$ *or* $25\,x$ *or* $\frac{25}{x}$ *or* $25 - x$)

Medhat bought x kg. of chocolate and put it in a box that costs L.E. 5 Calculate what Medhat should pay in terms of x if the price of 1 kg. of chocolate is L.E. 28

....

....



Complete the following :

(a) If the sum of two numbers is 30 and one of them is x , then the other = ...

(b) The sum of what Manal and Nihal have is L.E. 10 If Manal has L.E. x , then Nihal will have L.E. ....

(c) The side length of an equilateral triangle is ℓ and its perimeter is p , then the mathematical relation between p and ℓ is : p = ...

(d) The perimeter of a square is p , and its side length is ℓ , then the mathematical relation between p and ℓ is : p = ...

(e) The side length of a rhombus is x and its perimeter is p , then the mathematical relation between p and x is : p = ...

(f) The perimeter of a rectangle is 20 cm. If its length is x cm. , then its width = ...

(g) If the area of a rectangle is A and whose length is x and width is 5 cm. then : A = ...

(h) The lengths of two adjacent sides of a parallelogram are x and y , then its perimeter = ...

(i) The length of a rectangle is 3 cm. more than its width. Let the length be ℓ cm. , then the width will be .... cm.

If y = 4 x is the mathematical relation between x and y , then complete the table :

x	3	1	5	....	....	....
y	....	....	....	24	16	28

The price of a meal in a restaurant is L.E. 25 , and L.E. 3 are added for delivery service , it does not matter , how many meals.

If x is the number of meals Bassem order , and y is the total price he has to pay , then write a mathematical relation between x and y

....

Find the total price Bassem has to pay if he order 3 meals.

....

....

The owner of a factory pays the daily wage of one of his workers according to the mathematical relation $y = 12 + 5X$ Where X represents number of working hours done in overtime and y represets the daily wage in L.E.

(a) Complete :

The constant daily wage = L.E. ....

The constant daily wage and overtime wage = L.E. ....

(b) Complete the following table that shows the mathematical relation of the daily wage according to the overtime hours :

Number of overtime hours (x)	0	1	2	....	....	5
Total daily wage (y)	....	....	....	27	32	....

An isosceles triangle with base 5 cm.

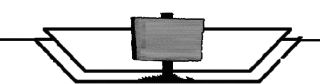
Find the mathematical relation between the lengths of its sides and its perimeter Let p represent the perimeter of the triangle ABC and ℓ represent the length of $\overline{AB}$

....

....

A

C 5 cm. B



Solve each of the following equations :

$x + 3 = 12$ ....

....

....

....

....

$x + 8 = 15$ ....

....

....

....

....

$x - 7 = 25$ ....

....

....

....

....

$y - 5 = 7$ ....

....

....

....

....

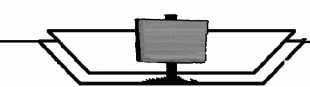
$4x = 16$ ....

....

....

....

....



Solve each of the following equations :

$3x = 27$ ....

....

....

....

....

$\frac{1}{6}x = 12$ ....

....

....

....

....

$\frac{y}{5} = 1$ ....

....

....

....

....

$2x + 9 = 21$ ....

....

....

....

....

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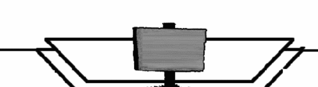
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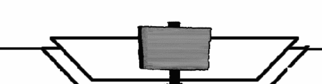


Solve each of the following equations :

$3y - 5 = 7$ ....

$\frac{1}{3}x + 8 = 10$ ....

$\frac{x}{6} - 3 = 2$ ....



Underline the solution of each of the following equations :

(a) $p + 4 = 18$, (4 , 22 , 14 , 72)

(b) $10\ m = 90$, (9 , 100 , 10 , 90)

(c) $k \div 6 = 6$, (36 , 12 , 6 , 0)

(d) $x - 150 = 50$, (200 , 150 , 100 , 3)

(e) $\frac{y}{12} = 3$, (15 , 4 , 36 , 39)

(f) $4\ x - 4 = 12$, (1 , 2 , 4 , 8)

(g) $3\ y + 5 = 29$, (34 , 24 , 8 , 6)

Choose the correct answer :

(a) If $x + 5 = 11$, then : x = ... (5 or 8 or 7 or 6)

(b) If $16 - y = 3$, then : y = ... (19 or 6 or 13 or 12)

(c) If $z \times 9 = 63$, then : z = ... (7 or 9 or 8 or 6)

(d) If $k \div 8 = 7$, then : k = ... (15 or 1 or 56 or 8)

(e) If $25 \div p = 5$, then : p = ... (20 or 5 or 30 or 1)

(f) If $3\ x + 1 = 19$, then : x = ... (18 or 12 or 8 or 6)

(g) If $2\ y - 4 = 6$, then : y = ... (6 or 5 or 2 or 1)

(h) If $3\ x = 12$, then : $\frac{1}{2}\ x$ = ... (9 or 6 or 4 or 2)

(i) If $6\ y = 18$, then : $5\ y$ = ... (3 or 5 or 15 or 30)

(j) If $y \div 2 = 8$, then : $\frac{1}{4}\ y$ = ... (2 or 4 or 6 or 8)

Translate each verbal statement into an equation :

(a) The sum of the number x and 6 is 9 ....

(b) A number if added to 17 the sum is 28 ....

(c) If 9 is subtracted from a number , then the result is 23

....

Underline the solution of each of the following equations :

(a) $p + 4 = 18$, (4 , 22 , 14 , 72)

(b) $10\,m = 90$, (9 , 100 , 10 , 90)

(c) $k \div 6 = 6$, (36 , 12 , 6 , 0)

(d) $x - 150 = 50$, (200 , 150 , 100 , 3)

(e) $\frac{y}{12} = 3$, (15 , 4 , 36 , 39)

(f) $4x - 4 = 12$, (1 , 2 , 4 , 8)

Choose the correct answer :

(a) If $x + 5 = 11$, then : x = ... (5 *or* 8 *or* 7 *or* 6)

(b) If $16 - y = 3$, then : y = ... (19 *or* 6 *or* 13 *or* 12)

(c) If $z \times 9 = 63$, then : z = ... (7 *or* 9 *or* 8 *or* 6)

(d) If $k \div 8 = 7$, then : k = ... (15 *or* 1 *or* 56 *or* 8)

(e) If $25 \div p = 5$, then : p = ... (20 *or* 5 *or* 30 *or* 1)

(f) If $3x + 1 = 19$, then : x = ... (18 *or* 12 *or* 8 *or* 6)

Translate each verbal statement into an equation :

(a) The sum of the number x and 6 is 9 ....

(b) A number if added to 17 the sum is 28 ....

(c) If 9 is subtracted from a number , then the result is 23 ....

(d) Three times of a number is 12 ....

(e) If 5 is subtracted from 3 times of a number , then the result is 16

....

Find the number which if added to 3 , the sum is 9

....

....

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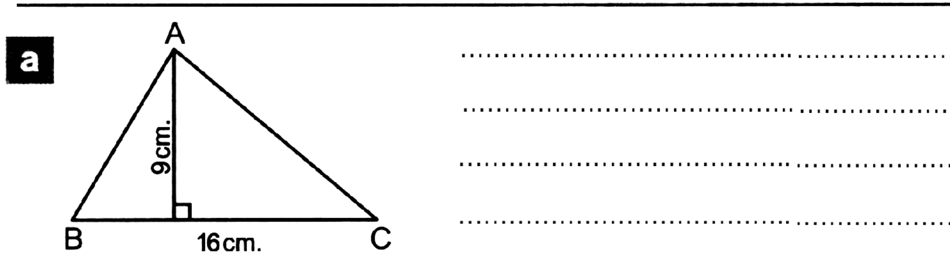
Unit 3

Measurement

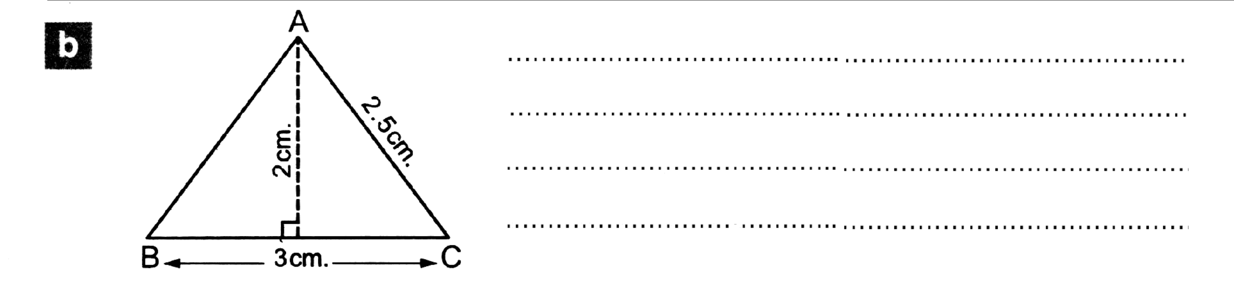
Exercises 1

Find the area of Δ ABC in each the following triangles:

a



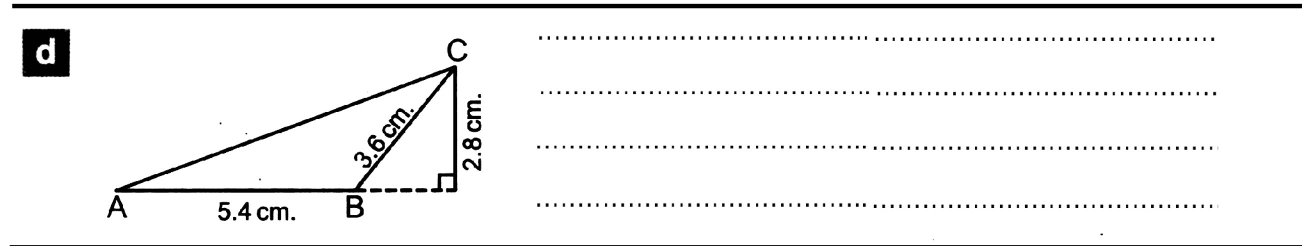
b



c



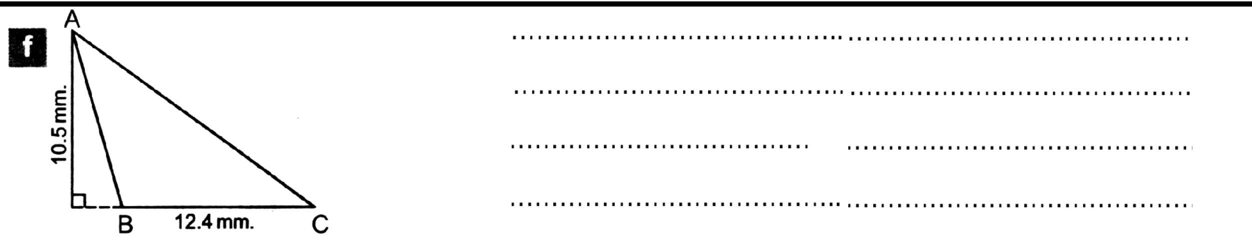
d



e



f



Complete:

a The area of a triangle = $\frac{1}{2}$ × .... × ....

b b = $\frac{\text{............}}{h}$

c If the length of the base = 6 cm. and the height = 4 cm., then the area of this triangle = ... $cm.^2$

d If the area of a triangle is 30 $cm.^2$ and its base length is 6 cm. , then its height = ... cm.

e The number of the altitudes of the equilateral triangle = ...

f The number of the altitudes of the right-angled triangle = ...

If the area of a triangle is 60 $cm.^2$ and its base length is 7.5 cm. , calculate its height.

....

....

The area of a triangle is 180 $cm.^2$, and its height is 45 cm. Find the base length.

....

....

Which is larger in area, a piece of land in the shape of a triangle with base 10 m. and height 3 m. or a garden in the shape of a square with side length 5 m. ?

....

....

....

Which is larger in area, a garden in the shape of a triangle with base 8 m. and height 7 m. or a land in the shape of a rectangle with length 8 m. and width 3 m. ?

....

....

....

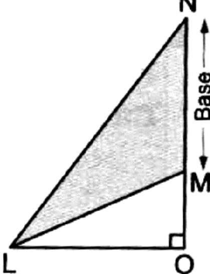
Complete :

a If the area of a triangle is 120 cm^2 and its height = 1.2 dm. , then its base length = ... cm.

b If ABC is a right-angled triangle at B, and BC = 10 cm., AB = 8 cm., then its area = ... cm^2

c If the perimeter of an equilateral triangle is 18 cm., and its area is 15 cm^2 , then its height is .... cm.

d In the opposite figure, the base length of the triangle = NM and its height = ...



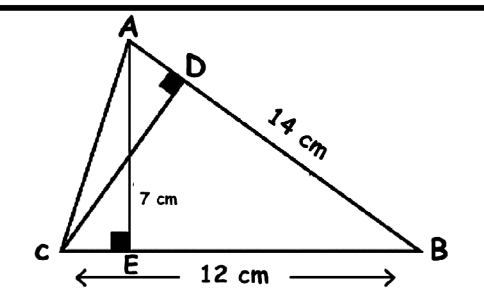
In the opposite figure :

[a] Find The area of the triangle ABC .

[b] Find the length of CD.

....

....



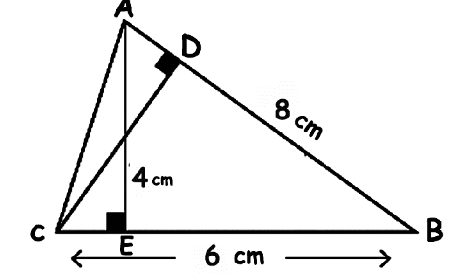
In the opposite figure :

[a] Find The area of the triangle ABC .

[b] Find the length of CD.

....

....



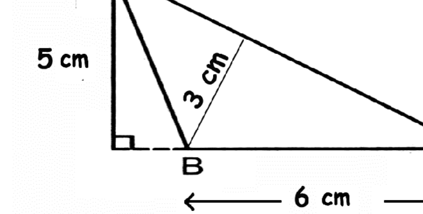
In the opposite figure :

[a] Find The area of the triangle ABC .

[b] Find the length of AC

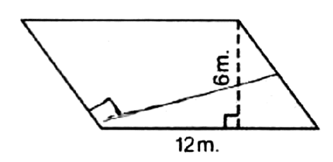
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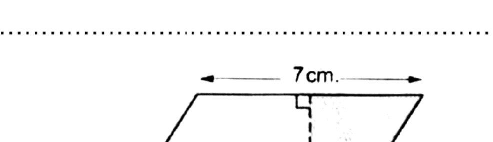
Exercises 2

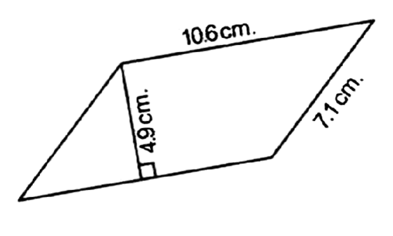
Find the area of each parallelogram :

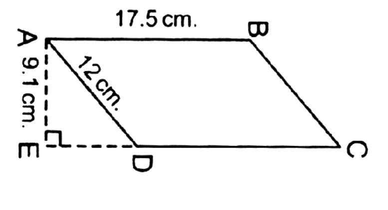


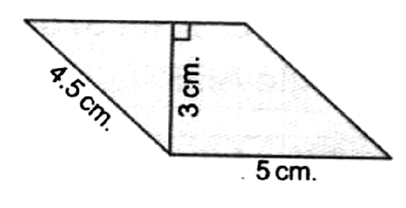
2 mm.
2.2 mm.

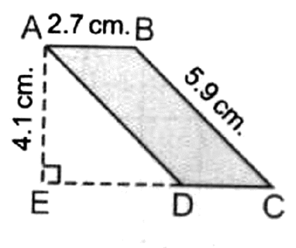
12 cm.
6 cm.
7.5 cm.











Which is larger in area , a parallelogram of a side length 3.6 cm. and its corresponding height is 5 cm. or a triangle with base length 10 cm. and height 6.2 cm. ?

....
....
....
....

Find the area of the parallelogram ABCD if AB = 6 cm. , BC = 12 cm. , and the greater height is 4 cm.

....
....

ABCD is a parallelogram of area 375 cm^2, E is a point on $\overline{CD}$, Find the area of the triangle AEB

....
....
....

If the area of a parallelogram is 36 cm^2 and its height is 9 cm. , then find the length of the corresponding base of this height.

....
....
....

If the area of a parallelogram is 380 mm^2 and its height is 38 mm. , what is the length of the base ?

....
....
....

If the height of a parallelogram is 34.6 cm. and the base is 15.2 cm. , what is the area of the parallelogram ?

....
....
....

Exercises 3

Complete :

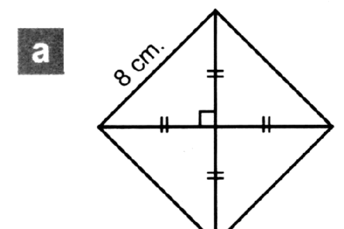
a The area of the square = the side length × ....

b The area of the square = $\frac{1}{2}$ × .... × ....

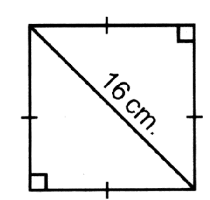
c If the side length of the square = 4 cm. , then its area = ... cm^2

d If the length of the diagonal of the square = 6 cm. , then its area = ... cm^2

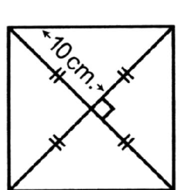
Find the area of each of the following squares :

a


....
....
....

b


....
....
....

c


....
....
....

A square is of side length 7 cm. , find its area.

....
....

The diagonal length of a square is 10 cm. Find the area of the square.

....
....

If the length of the diagonal of a square is 5.4 cm. , then find its area.

....
....

A square has a side length of 1.6 m. , find its area.

....
....

If the area of a square is 64 cm^2 , find its side length and its perimeter.

....

....

Find the area of a square whose perimeter is 12 cm.

....

....

Which is greater in area : a square of side length 9 cm. or another square of diagonal length 12 cm. ?

....

....

....

....

Which is greater in area , a square , whose diagonal is 10 cm. or a right-angled triangle whose right angle sides are 8 cm. and 15 cm.

....

....

....

....

Two pieces of land are equal in area. The first is a square-shaped and the second is a rectangle of length 9 m. and width 4 m. Find the perimeter of the square piece.

....

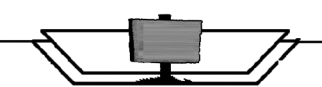
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A piece of land has the shape of a parallelogram whose base length is 20 m. and its corresponding height is 16 m. , inside this piece of land there is a bed of flowers that has the shape of a square whose diagonal length is 8 cm. Find the area of the part that is not planted.



Exercises 4

1 **Complete :**

a The area of the rhombus = the side length × ....

b The area of the rhombus = $\frac{1}{2}$ × the product of ....

c If the lengths of the diagonals of a rhombus are 20 cm. and 10 cm. , then its area = ... cm^2

d A rhombus is of side length 12 cm. and its height = 4 cm. , then its area = ... cm^2

2 **Find the area of each of the following rhombuses :**

a
3 cm.
15 cm.

....

....

....

....

b
6 cm.
3 cm.

....

....

....

....

c
12 cm.
18.5 cm.

....

....

....

....

d
12 cm.
16 cm.

....

....

....

....

e
12 cm.
6 cm.

....

....

....

....

f
3.1 cm.
6 cm.
3.5 cm.

....

....

....

....

A rhombus of side length = 6 cm. and its height is 5 cm. Find its area.

....

....

The lengths of the diagonals of a rhombus are 24 cm. and 10 cm. Find its area.

....

....

If the area of a rhombus is 26 cm^2 and its side length equals 6.5 cm. Find its height.

....

....

If the height of a rhombus is 10 cm. and its area = 54 cm^2 , find its side length.

....

....

Which is greater in area : a parallelogram of base length 6.2 cm. and its corresponding height = 3.8 cm. or a rhombus whose diagonals lengths are 6.2 cm. and 3.8 cm. ?

....

....

....

The area of a rhombus is 20 cm^2 and the length of one of its diagonals is 5 cm. , then find the length of the other diagonal.

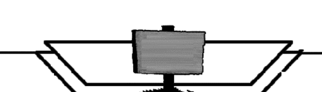
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Find the area of a rhombus of side length = 8 cm. and its height equals twice its side length.

....

....





The lengths of the diagonals of a rhombus are 12 cm. and 16 cm. , and its height is 9.6 cm. Find its side length.

....

....

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....

If the perimeter of a rhombus is 24 cm. and its area is 30 cm^2 , then find its height.

....

....

....

....

In the opposite figure :
ABCD is a rhombus of side length 10 cm. and the lengths of its diagonals are 12 cm. and 16 cm. Find its area and the length of each of $\overline{DE}$ and $\overline{DF}$
"What do you notice?"

D A F C E B

....

....

....

....

In the opposite figure :
the area of the rectangle ABCD equals 144 $cm.^2$
If AB = 8 cm. , calculate the area of the rhombus AFDE

E D A M 8cm. C F B

....

....

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Exercises

Find each circumference of the following circles to the nearest tenth : " $\pi = 3.14$ "

a r = 4 cm.

……………………………………
……………………………………
……………………………………

b r = 4.5 cm.

……………………………………
……………………………………
……………………………………

c r = 47.2 cm.

……………………………………
……………………………………
……………………………………

d d = 20 cm.

……………………………………
……………………………………
……………………………………

e d = 67 m.

……………………………………
……………………………………
……………………………………

f d = 94.4 cm.

……………………………………
……………………………………
……………………………………

Find each circumference of the following circles: " $\pi = \frac{22}{7}$ "

a its radius length = 31.5 cm.

……………………………………
……………………………………
……………………………………

b its diameter length = 24.5 cm.

……………………………………
……………………………………
……………………………………

c r = 28 mm.

……………………………………
……………………………………
……………………………………

d d = **17.5 cm.**

……………………………………
……………………………………
……………………………………

Calculate the radius length of each of the following circles :

a Its circumference = 55 cm. ($\pi = \frac{22}{7}$)

……………………………………
……………………………………
……………………………………

b Its circumference = 36.11 cm ($\pi = 3.14$)

……………………………………
……………………………………
……………………………………

c Its diameter length = 32 cm.

……………………………………
……………………………………
……………………………………

d Its half circumference = 9.42 cm. ($\pi = 3.14$)

……………………………………
……………………………………
……………………………………

Which is longer :
The circumference of the circle of radius length 7.7 cm. or the perimeter of the rectangle of dimensions 5.3 cm. and 4.8 cm. ? $(\pi = \frac{22}{7})$

....

....

....

....

A circle is of circumference 66 cm. Find the length of its diameter. "$\pi = \frac{22}{7}$"

....

....

If half the circumference of a circle equals 314 cm., find its diameter length in metres. "$\pi \simeq 3.14$"

....

....

Complete :

a The diameter length = 2 × ....

b If the radius of a circle = 5 cm. long, then the length of the longest chord = ... cm.

c If the length of the greatest chord in a circle = 7 cm., then its circumference = ... cm. where ($\pi = \frac{22}{7}$)

d If the radius length of a circle = x cm. , then its circumference equals .... cm.

e If the circumference of a circle is 10 π cm., then its radius length is .... cm.

f If half of the circumference of a circle is 157 cm., then its diameter length is .... cm. ($\pi \simeq 3.14$)

Choose the correct answer from the given ones :

a The circumference of a circle = ... ($2\pi r$ or πr or $4\pi r$ or $2\pi d$)

b The circumference of the circle with diameter of length 7 cm. equals .... cm. ($\pi = \frac{22}{7}$) (22 or 44 or 66 or 88)

c The diameter length of the circle whose radius length 4 cm. equals .... cm. (2 or 4 or 6 or 8)

d If the circumference of a circle is 44 cm. , then its diameter length is .... cm. (28 or 14 or 7 or 9)

e The circumference of a circle ÷ r = ...

(π or 2π or $\frac{\pi}{2}$ or $\frac{1}{2}$)

f Twice the circumference of a circle with radius r cm. long = ...

(πr or $2\pi r$ or $3\pi r$ or $4\pi r$)

g π = ...

($\frac{\text{circumference}}{r}$ or $\frac{\text{circumference}}{2r}$ or $\frac{2\text{ circumference}}{r}$ or $\frac{\text{circumference}}{3r}$)

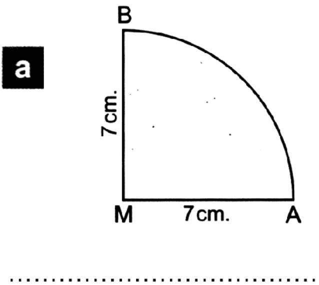
h If half the circumference of a circle is 25.12 cm., then the length of its radius = ... cm. ($\pi = 3.14$)

(2 or 4 or 8 or 16)

i If the radius length of a circle is 20 cm., then its circumference = ... cm. (10π or 20π or 40π or 80π)

Calculate the perimeter of each of the following figures where " $\pi = \frac{22}{7}$ " :

a



....

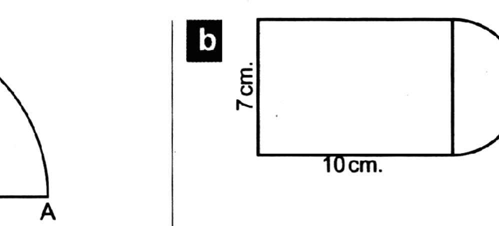
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b



....

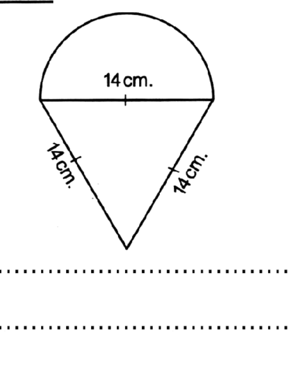
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c



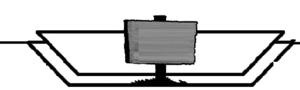
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Unit 4

Geometric Transforations



Tell whether each transformation is the result of a flip, slide or a turn :

a	b	c ....
d	e	f ....
g	h	i ....
j	k	l ....
m	n	o ....
p	q	r ....
s	t	u ....

Choose the correct answer :

(a) Which of these techniques can transform the letter **b** into the letter **d** ?

(Reflection **or** Rotation **or** Translation)

(b) Which of these techniques can transform the letter **d** into the letter **p** ?

(Reflection **or** Rotation **or** Translation)

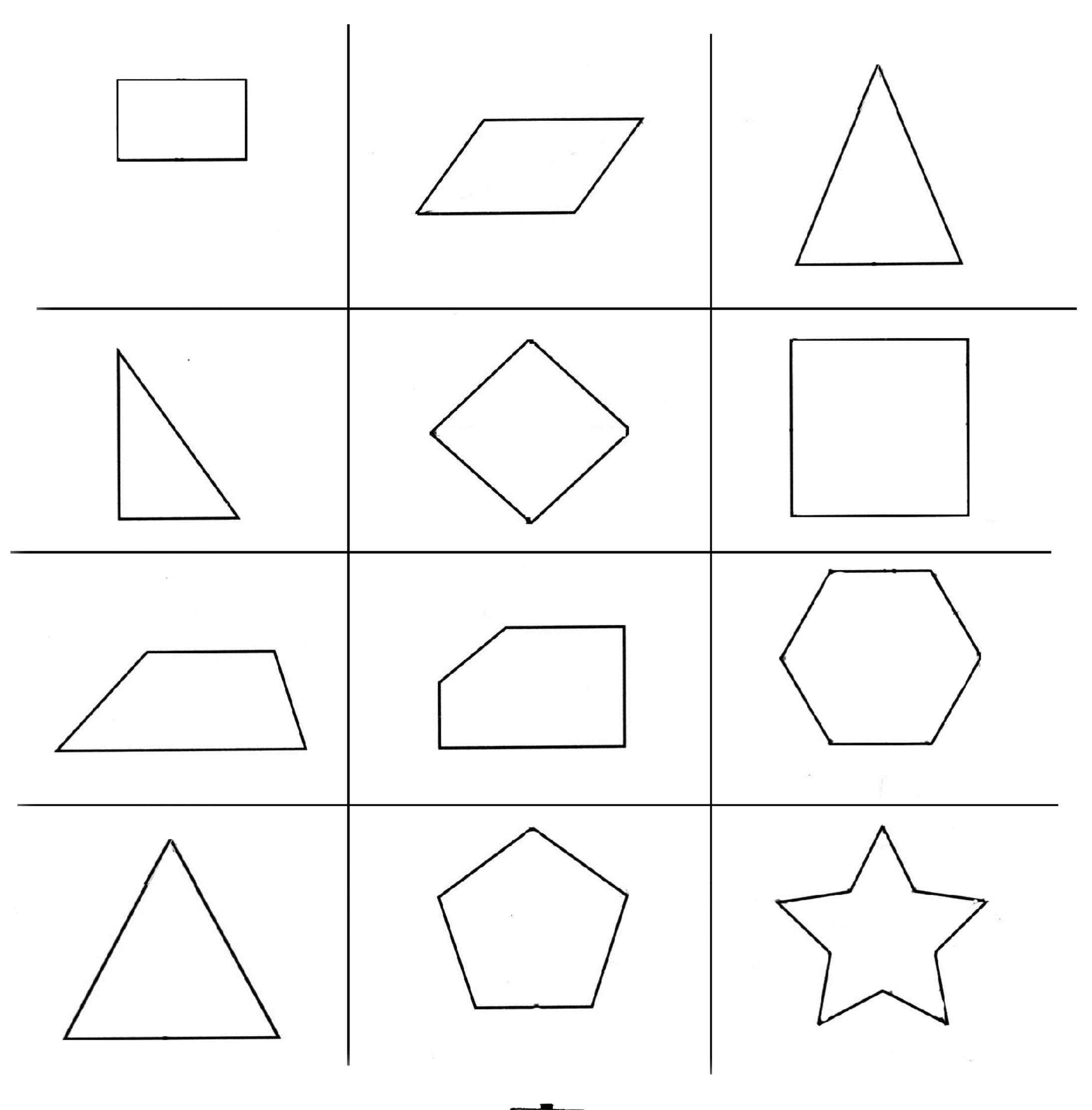
(c) Which of these techniques can transform the letter **M** into the letter **W** ?

(Reflection **or** Rotation **or** Translation)

(d) Which of these techniques can transform the letter **Z** into the letter **N** ?

(Reflection **or** Rotation **or** Translation)

In each of the following, if the figure is symmetrical, then draw all the axis of symmetry to it :



Complete the following :

(a) The symmetry axis divides the figure into two ………… halves.

(b) The isosceles triangle has ………… axis of symmetry.

(c) The equilateral   has ………… axes of symmetry.

(d) The isosceles trapezium has ………… axes of symmetry.

(e) The square has ………… axes of symmetry.

(f) The rectangle has ………… axes of symmetry.

(g) The rhombus has ………… axes of symmetry.

(h) The regular hexagon has ………… axes of symmetry.

(i) A diagonal of the rectangle divides it into two ……………………… triangles,
but it is not ………………………………… for the rectangle.

Choose the correct answer :

(a) The scalene triangle has ………… axes of symmetry. (2 **or** 0 **or** 1)

(b) The parallelogram has ………… axes of symmetry. (4 **or** 2 **or** 0)

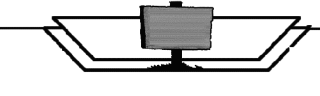
(c) Which of these figures has the greater number of axes of symmetry ?…………
(square **or** equilateral triangle **or** rectangle)

(d) The regular pentagon has ………… axes of symmetry. (0 **or** 1 **or** 5)

(e) This figure has ………… axes of symmetry. (4 **or** 1 **or** 2)

(f) This figure has ………… axes of symmetry. (1 **or** 0 **or** 2)

(g) In the opposite letters : K X B F
which ones have only one axis of symmetry ?
(K and X **or** B and F **or** K and B)



Write the letter for the point named by the coordinates :

a (8 , 6) are the coordinates of ....

b (2 , 2) are the coordinates of ....

c (5 , 4) are the coordinates of ....

d (0 , 0) are the coordinates of ....

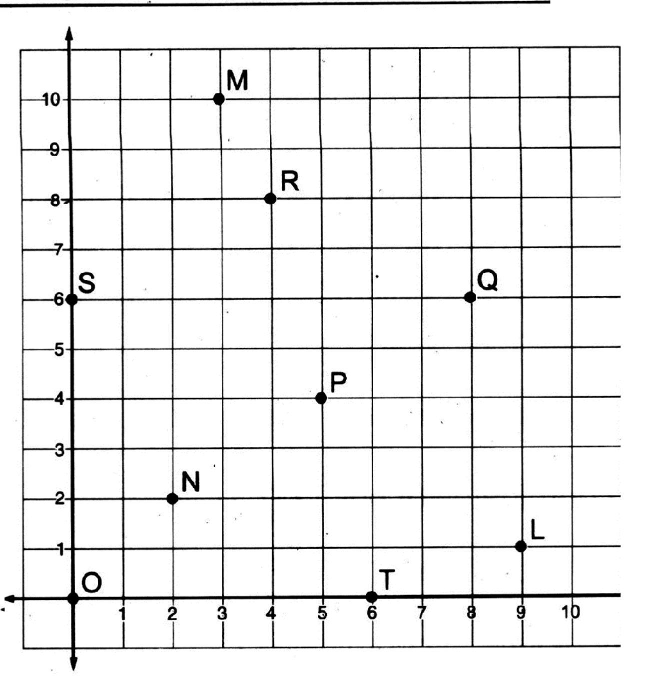
e (0 , 6) are the coordinates of ....

f (3 , 10) are the coordinates of ....

g (9 , 1) are the coordinates of ....

h (4 , 8) are the coordinates of ....

i (6 , 0) are the coordinates of ....



In the following grid, write the coordinates of each of the following points :

A (..... , ...)

B (..... , ...)

C (..... , ...)

D (..... , ...)

E (..... , ...)

F (..... , ...)

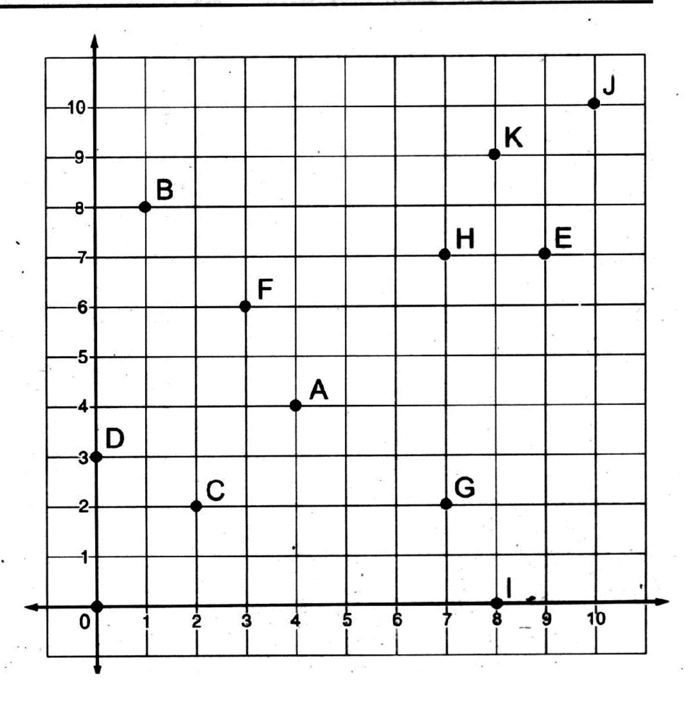
G (..... , ...)

H (..... , ...)

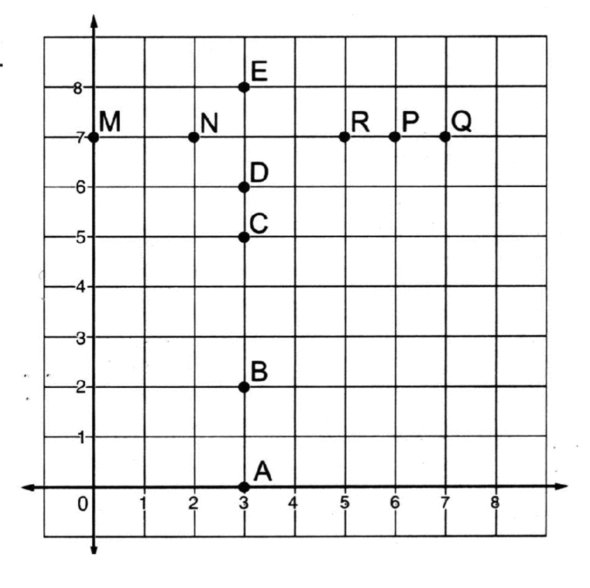
I (..... , ...)

J (..... , ...)

K (..... , ...)



In the following grid, observe and complete :



a A (..... , ...)

b B (..... , ...)

c C (..... , ...)

d D (..... , ...)

e E (..... , ...)

g M (..... , ...)

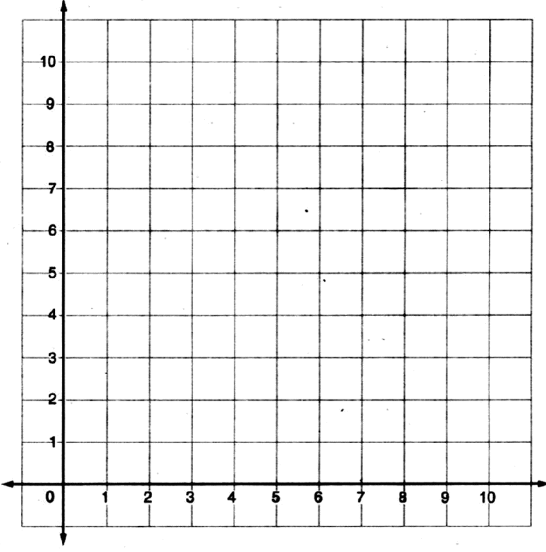
h N (..... , ...)

i R (..... , ...)

j P (..... , ...)

k Q (..... , ...)

In the opposite grid :

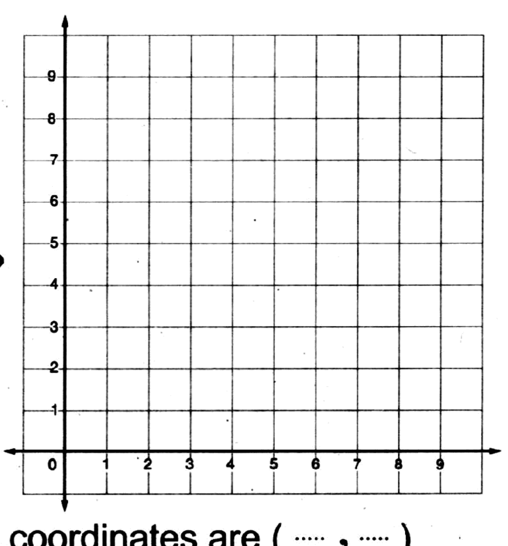


a Graph the figure ABCD where :
A = (2 , 8) , B = (3 , 4) , C = (8 , 4)
and D = (7 , 8)

b What is the name of the figure ABCD ?
ABCD is ....

c Use the geometric instruments to find the coordinates of the intersection of the two straight lines $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$

In the opposite grid :

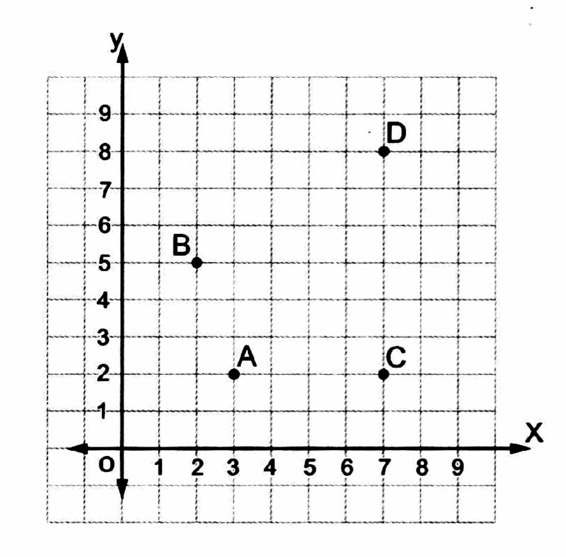


a Graph the figure XYZT
where : X = (1 , 5) , Y = (5 , 1) ,
Z = (9 , 5) and T = (5 , 9)

b What is the name of the figure XYZT ?
XYZT is ....

c Use the geometric instruments to find the coordinates of the intersection of the two straight lines $\overleftrightarrow{XZ}$ and $\overleftrightarrow{YT}$ The coordinates are (..... , ...)

In the opposite figure :



(a) Complete :

(1) Point C (····· , ·····) and

point D (····· , ·····)

(2) AC = ·········· units and

CD = ·········· units.

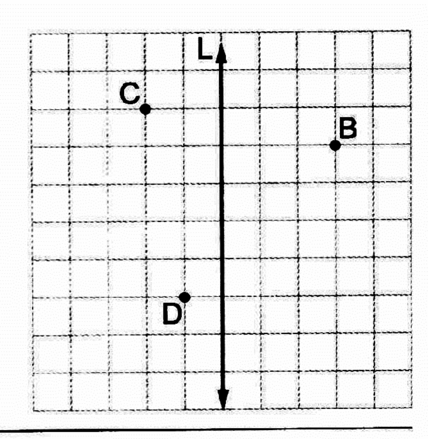
(b) On the figure , plot the points M (5 , 2) and N (5 , 8) , then complete :

CM = ·········· units. , MN = ·········· units. , ND = ·········· units.

The name of the figure MNDC is ·········· and the perimeter of the figure MNDC is ·········· units.

In the opposite figure :

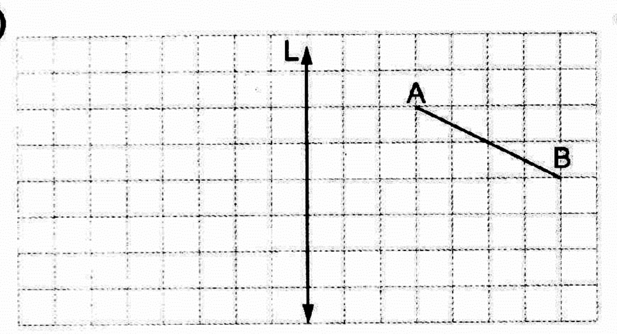
Find the image of points B , C and D by reflection across L.



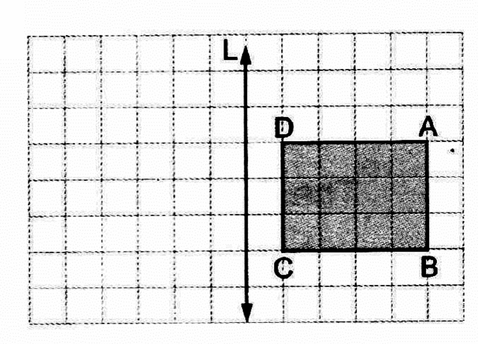
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5 In each of the following , find the image of the figure by reflection across L :

(a)

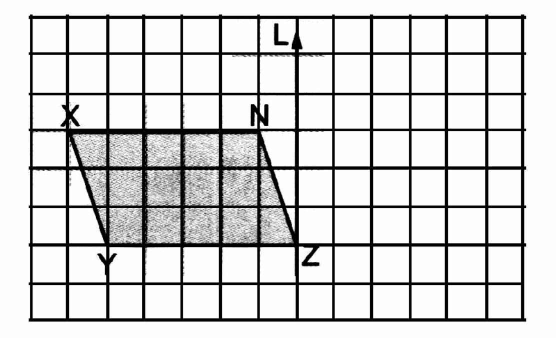


(b)



In the opposite figure :

Find the image of the parallelogram XYZN by reflection across L , then complete :

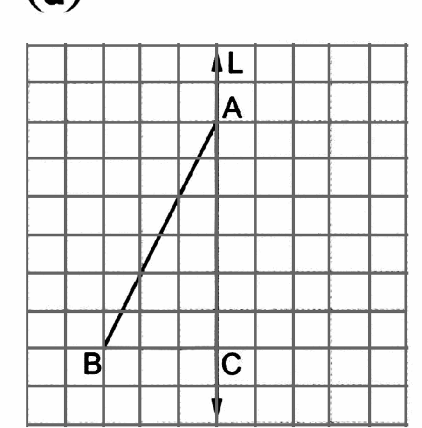


(a) The image of the parallelogram XYZN by reflection across L is the parallelogram ....

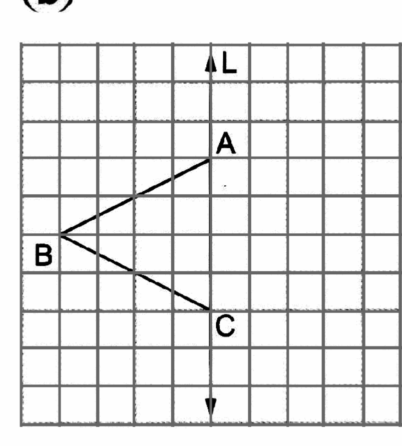
(b) XY = ... and YZ = ...

Determine the image of each figure by reflection across L :

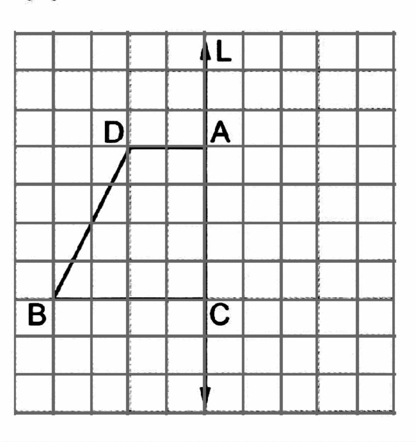
(a)



(b)



(c)



Refer to the previous figures , complete :

(1) Each figure and its image are ....

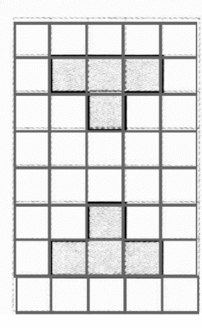
(2) The image of point A is .... because it ....

(3) The image of point C is .... because it ....

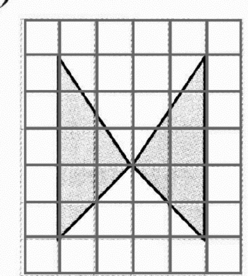
(4) If the paper - where the figure is drawn on - is folded along the axis of symmetry the figure coincides on ....

Draw the axis of symmetry to make one of the following figures an image to the other :

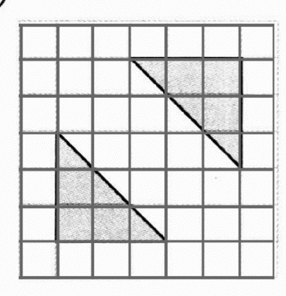
(a)

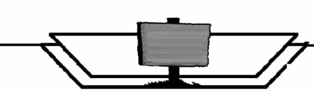


(b)



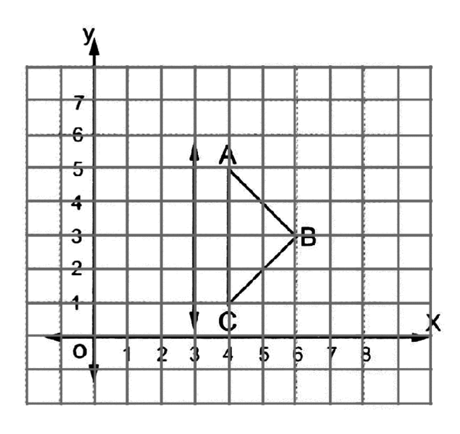
(c)



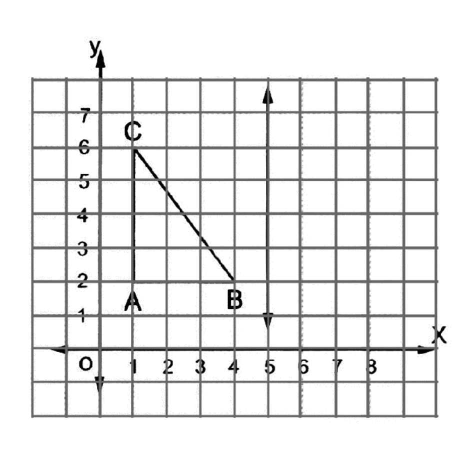


In each of the following , draw a triangle which is a reflection image of the given triangle across the black line :

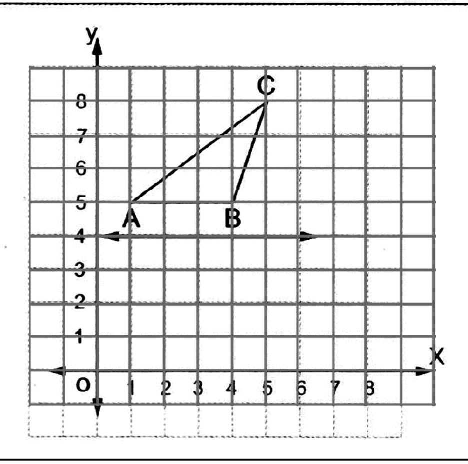
(a)



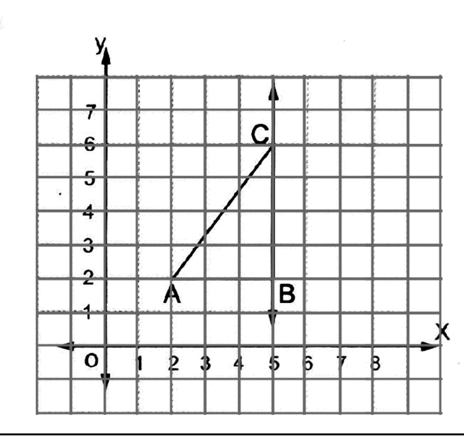
(b)



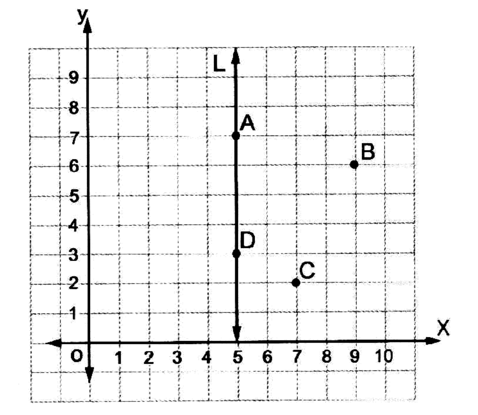
(c)



(d)



On the coordinate plane illustrated in the opposite figure :



(a) Complete :

A (····· , ·····)

B (····· , ·····)

C (····· , ·····)

D (····· , ·····)

(b) If L is the axis of reflection to the figure ABCD , Complete :

(1) The image of B by reflection across L is B̀ (····· , ·····)

(2) The image of C by reflection across L is C̀ (····· , ·····)

(3) The image of A by reflection across L is À (····· , ·····)

(4) The image of D by reflection across L is D̀ (····· , ·····)

(5) The image of Δ BCD by reflection across L is ·········

(6) The image of the figure ABCD by reflection across L is ·········

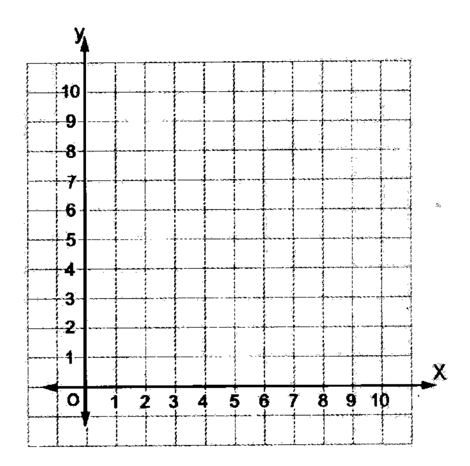
On a coordinate plane :

(a) Plot the following points :
A (3 , 5) , B (6 , 5) and C (3 , 2).

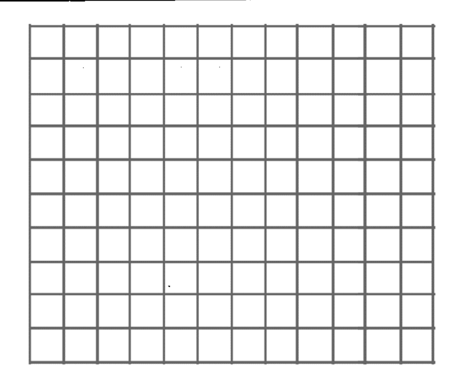
(b) Find the length of $\overline{AC}$.

(c) Find the length of $\overline{AB}$.

(d) Draw the image of Δ ABC by reflection across $\overleftrightarrow{AC}$ and determine the ordered pairs that represent the vertices of the image.



On the coordinate plane :
Draw the triangle ABC , where A (3 , 1) , B (3 , 5) and C (1 , 1) , then draw the image of Δ ABC by reflection across $\overleftrightarrow{AB}$.



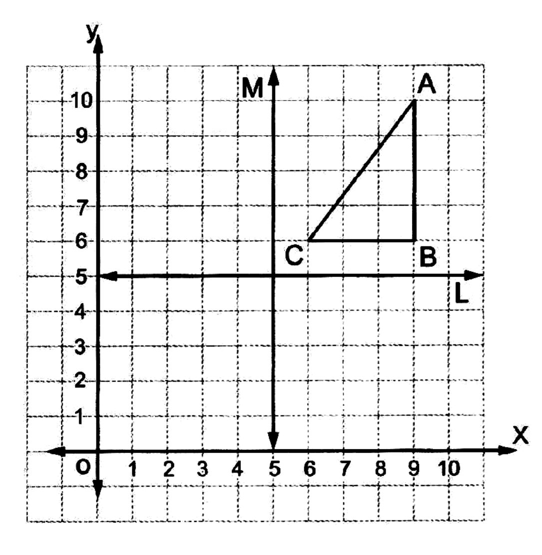
The opposite figure represents a coordinate plane :

(a) Write the coordinates of points A , B and C.

A ....

B ....

C. ....

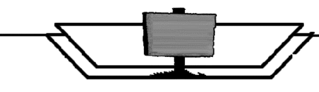


(b) Draw Δ À B̀ C̀ the image of Δ ABC by reflection across (L) and determine the coordinates of the vertices À , B̀ and C̀.

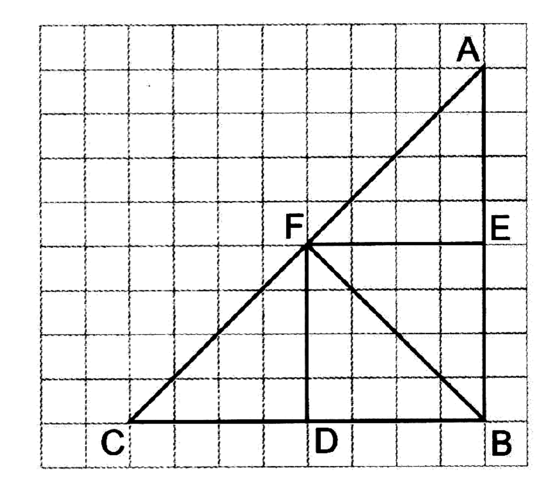
À .... , B̀ .... and C̀. ....

(c) Draw Δ A̋ B̋ C̋ the image of Δ ABC by reflection across (M) and determine the coordinates of its vertices A̋ , B̋ and C̋.

A̋ .... , B̋ .... and C̋. ....



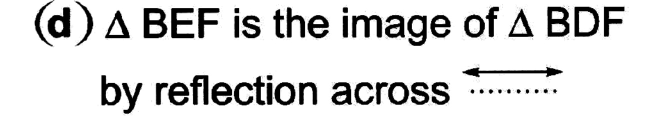
In the opposite figure , Complete :



(a) Δ BEF is the image of Δ AEF by reflection across $\overleftrightarrow{\cdots\cdots}$

(b) Δ BDF is the image of Δ CDF by reflection across $\overleftrightarrow{\cdots\cdots}$

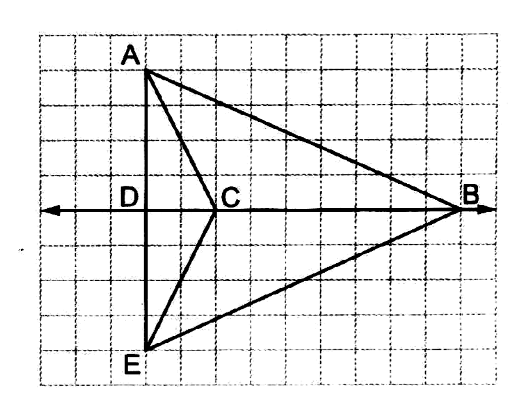
(c) Δ ABF is the image of Δ CBF by reflection across $\overleftrightarrow{\cdots\cdots}$



(d) Δ BEF is the image of Δ BDF by reflection across $\overleftrightarrow{\cdots\cdots}$

In the opposite figure , $\overleftrightarrow{BD}$ is the axis of reflection.

Complete :



(a) The image of Δ ABC by reflection across $\overleftrightarrow{BD}$ is .... , then

AB = ... and AC = ...

(b) The image of Δ ACD by reflection across $\overleftrightarrow{BD}$ is .... , then

AD = ... and $\overline{CD}$ = ...

coincides on ....

(c) Δ ABC is congruent to Δ ....

and Δ ECD is congruent to Δ ....

Unit 5

Statistics

An employee spends his monthly salary as follows :

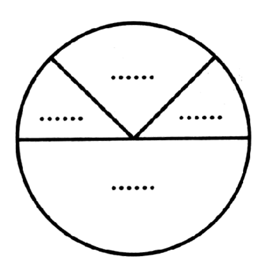
L.E. 200 for buying clothes.

L.E. 800 for buying food.

L.E. 400 for transport and medical treatment.

L.E. 200 for the rent of his flat.

Represent these data on the opposite circle.



A librarian classified all the books existing in the library, he found that :

$\frac{1}{4}$ of the books are religious.

$\frac{1}{4}$ of the books are literary.

$\frac{1}{2}$ of the books are scientific.

Represent these data using the circular sectors.

If the total number of the books existing in the library is 800 books, then find the number of books of each type.

Exercises 1

Using the following word : abgedhawasshottlcalamonshaafass

a Complete the frequency table at the right using the name of the word.

b Describe the data recorded in your frequency table.

Letter	Tally	Frequency
a	~~||||~~ |||	8
e	....	....
i	....	....
o	....	....
u	....	....

The table below represents the extra wages of 30 workers.
The required is forming a frequency table for these wages.

90	85	88	86	88	90
85	87	87	87	86	85
89	85	86	85	90	90
86	88	89	87	85	86
88	90	90	87	88	85

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The folowing data shows the ages of 60 students.
Make a frequency table of the ages of these students :

15	18	18	17	15	16	18	19	16	17	18	16
17	15	14	19	18	18	17	16	14	15	17	16
16	15	15	17	14	17	16	16	16	15	14	17
19	20	15	14	15	16	17	18	17	18	16	17
17	16	16	17	17	17	18	15	17	16	14	15

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11 **The following data shows the marks of 40 pupils of the first preparatory grade in algebra test (the maximum is 20) :**

7	11	7	13	14	3	18	13	10	14
16	8	15	12	5	15	11	12	6	11
8	9	15	8	15	14	7	10	14	19
10	7	2	10	12	4	11	17	13	15

Make a frequency table of the marks of algebra ,
using the sets 0 – , 4 – , 8 – , ··· etc ,

Exercises 2

The following table shows the frequency distribution of 120 students' marks in a certain examination .

Sets of marks	10 –	20 –	30 –	40 –	50 –	Total
Number of students	20	35	30	25	10	120

Draw the histogram for this data.

The following table shows the number of hours that a set of 50 students study in a day :

Sets	2 –	4 –	6 –	8 –	10 –	Total
Frequency	8	9	15	13	5	50

Draw the histogram for this data.

The following data represents the marks in the mathematics test for students in one classroom :

Sets	0 –	10 –	20 –	30 –	40 –	50 –
Frequency	6	10	15	20	8	4

a Draw the histogram for this distribution.

b Complete :

[1] The number of students whose marks are less than 20 = ...

[2] The number of students whose marks are 40 and more = ...

The following table gives the frequency distribution of the marks of pupils in the religion examination:

Sets of marks	0 –	4 –	8 –	12 –	16 –
Number of pupils	12	20	24	14	8

Draw a frequency polygon for this distribution, then find the marks that most of the pupils got.

Suppose that the height of 40 boys in a football club in centimetres are as follows :

160	168	175	165	188	170	163	184	174	168
164	171	182	167	161	173	182	181	189	184
174	168	165	175	162	161	169	178	185	179
180	162	160	174	187	166	165	181	163	166

a Complete the following frequency table :

Sets	160 –	165 –	170 –	175 –	180 –	185 –
Frequency	......	......	......	......	......	......

b Draw a histogram and a frequency polygon.

A class of 30 pupils had a 10 - question task. The results were :

6	7	6	5.5	7	5	7	10	8	6
8	7	6.5	10	6	7	9	10	8	8.5
8	9.5	9	7	7.5	7.5	9	5	9	8

a Arrange these scores in a frequency table using the sets :

5 – , 6 – , ... , 10 –

b Draw a histogram and a frequency polygon.

The ages of the employees in a company, rounded to the nearest year, are :

17	35	32	25	30	19	42	20	62	17
38	39	41	24	18	20	38	21	54	19
27	20	30	59	21	35	40	56	48	33

a Using a class interval of 10, beginning 15 – , 25 – , ...

construct a frequency table.

b Draw a histogram for the ages listed above.

Exercises 3

The following table shows the favourite TV programs for 60 pupils :

Sports	News	Series	Movies
15	5	10	30

Represent this data by a pie chart.

The table shows how Laila spent her money on a holiday:

a Represent these data by a pie chart.

Accommodation	Food	Air-plane	Shopping
LE 1080	LE 540	LE 1080	LE 1620

b What did she spend most of her money on ? ....

The following table shows the favourite sports for 120 pupils in a school:

a Complete the following table :

Football	Volleyball	Swimming	Basketball
40	....	40	30

b Represent these data by a pie chart.

The following table shows the number of tourists who come to Egypt from some countries :

Germany	France	Japan	USA
120 000	40 000	20 000	60 000

a Represent these data by a pie chart.

b Which country has the greatest number of tourists ?

C Which country has the lowest number of tourists ?